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CONTENTS OF VOLUME 89

STATION PUBLICATIONS ABSTRACTED

Alabama Station: Page
Bulletin 258 128
Bulletin 259 244
Circular 87 90
Circular 88 723
Circular 89 733
Alaska Station:
Circular 1 (rev.) 597
Arizona Station: Page
Bulletin 189 444
Technical Bulletin 98 335
Technical Bulletin 99 413
Mimeographed Report 52 596
Annual Report 1942 502, 503, 508

	Page
ARKANSAS STATION:	
Bulletin 429	215
Bulletin 430	441
Bulletin 431	486
Bulletin 432	585
Bulletin 433	445
CALIFORNIA STATION:	
Bulletin 476 (rev.)	379
Bulletin 613 (rev.)	593
Bulletin 670	487
Bulletin 672	579
Bulletin 673	447
Bulletin 676	563
Bulletin 678	515
Circular 333 (rev.)	248
Circular 353	698
Circular 354	669
Circular 355	727
Hilgardia—	
Vol. 14, No. 11, Feb. 1943	85
Vol. 15—	
No. 1, Mar. 1943	67
No. 2, Feb. 1943	631
No. 3, Apr. 1943	651
Mimeographed Report 82	130
Cost of Drying Cut Fruit, 1942 (A Preliminary Report)	386
COLORADO STATION:	
Bulletin 475	214
Bulletin 476	376
Bulletin 478	762
Technical Bulletin 30	228
Colorado Farm Bulletin, vol. 5, No. 2, Apr.-June 1943	307, 323, 330, 406
Annual Report 1942	256, 268
CONNECTICUT [NEW HAVEN] STATION:	
Bulletin 465	40
Bulletin 466	177
Bulletin 467	185
Bulletin 468 (Annual Report 1942)	405
Bulletin 469	442, 457
Bulletin 470	482
Bulletin 471	572
[CONNECTICUT] STORRS STATION:	
Bulletin 243	388
Bulletin 244	751

	Page
DELAWARE STATION:	
Bulletin 238 (Annual Report 1942)	405
Bulletin 241	459
Circular 13	723
Circular 14	474
FLORIDA STATION:	
Bulletin 378	178
Bulletin 379	109
Bulletin 380	582
Bulletin 382	477
Bulletin 383	476
Bulletin 384	437
Bulletin 385	580
Bulletin 386	747
Bulletin 387	738
Bulletin 388	745
Bulletin 389	721
Annual Report 1942	770, 778
GEORGIA STATION:	
Bulletin 224	215
Bulletin 225	263
Press Bulletin 525	500
Circular 140	59
Circular 141	80
Circular 143	719
GEORGIA COASTAL PLAIN STATION:	
Bulletin 35 (Annual Report 1942)	517, 616
Circular 9	485
Circular 10	439
Circular 11	442
HAWAII STATION:	
Bulletin 89	437
Bulletin 90	443
Bulletin 91	445
Biennial Report 1941–42	480, 499, 501, 508
IDAHO STATION:	
Bulletin 245	629
Bulletin 248	123
Bulletin 249	70
Bulletin 250	672
Bulletin 251 (Annual Report 1942)	589, 590, 599, 616
Circular 87	617
ILLINOIS STATION:	
Bulletin 495	109
Bulletin 496	660
Circular 545	132

ILLINOIS STATION—Continued.

Page
AE–1915, Market and Return Loads Hauled by Livestock Trucks in Illinois 261
AE–1949, Tire-Use Expectancy of Trucks, Hauling Farm Products, Illinois, 1942 261
AE–1982, A Survey of Motor Trucks in Douglas County, Illinois, September 1942 261
AE–2000, A Survey of Motor Trucks in Henderson County, Illinois, October 1942 261

INDIANA STATION:

Bulletin 476 129
Bulletin 477 221
Bulletin 478 596
Bulletin 479 600
Bulletin 480 601
Bulletin 481 737
Bulletin 482 661
Bulletin 483 733
Bulletin 484 747
Circular 278 357
Circular 279 290
Circular 280 227
Circular 281 308
Circular 282 472
Circular 283 584
Circular 284 516
Agricultural Economics Mimeograph—
Nos. 1–3, 6–8, 11–16, 18–25 125
No. 4 125
No. 5 124
Nos. 9, 10, 17 124
No. 26 126
Annual Report 1942 762, 770, 778

IOWA STATION:

Research Bulletin 310 462
Research Bulletin 311 495
Research Bulletin 312 473
Research Bulletin 313 597
Research Bulletin 314 449
Research Bulletin 315 595
Research Bulletin 316 623
Research Bulletin 317 559
Research Bulletin 318 533
Research Bulletin 319 585
Research Bulletin 320 705

IOWA STATION—Continued.

Page
Bulletin P50 131
Bulletin P51 57
Bulletin P52 127
Bulletin P53 178
Bulletin P54 539
Bulletin P55 595
Bulletin P56 541, 542
Contributions From Iowa Corn Research Institute, vol. 3, No. 1, Mar. 1943 622
Annual Report 1942, part 1 508
Annual Report 1942, part 2 616

KANSAS STATION:

Bulletin 302 25
Bulletin 311 205
Bulletin 312 259
Bulletin 313 312
Bulletin 315 579
Technical Bulletin 54 644
Agricultural Economics Report 17 123
Agricultural Economics Report 18 748
Poultry Bibliography 350

KENTUCKY STATION:

Bulletin 434 250
Bulletin 435 243
Bulletin 436 238
Bulletin 437 229
Bulletin 438 353
Bulletin 439 284
Bulletin 440 281
Bulletin 441 743
Regulatory Series Bulletin 34 635
War Labor Supply and Farm Production on Eastern Kentucky Farms 744

LOUISIANA STATION:

Bulletin 356 135
Bulletin 357 329
Bulletin 358 107
Bulletin 359 207
Bulletin 360 264
Bulletin 361 386
Bulletin 362 748
Bulletin 363 572
Circular 29 206
Mimeographed Circular 20 746
Mimeographed Circular 25 738
Mimeographed Circular 29 745

LOUISIANA STATION—Continued.	Page
Mimeographed Circular 31	124
Mimeographed Circular 32	741
Mimeographed Circular 33	747
Northeast Louisiana Station Biennial Report 1941–42	711, 779

MAINE STATION:	
Bulletin 411 (Report 1942)	70, 141
Bulletin 411–C	24, 81
Bulletin 414	209
Bulletin 415	306
Bulletin 416	326
Bulletin 417	735
Bulletin 418	746
Bulletin 419	697
Official Inspections 186	213, 214

MARYLAND STATION:	
Bulletin A6	472
Bulletin A7	465
Bulletin A8	384
Bulletin A9	384
Bulletin A10	482
Bulletin A11	389
Bulletin A12	474
Bulletin A13	354
Bulletin A14	314
Bulletin A15	385
Bulletin A16	386
Bulletin A17	387
Bulletin A18	390
Bulletin A19	383
Bulletin A20	469
Bulletin A24	711
Popular Bulletin 1	446
Miscellaneous Publication 15	596
Annual Report 1941 and Bulletin Supplement	453, 507, 509

MASSACHUSETTS STATION:	
Bulletin 397	316
Bulletin 398 (Annual Report 1942)	411, 509
Bulletin 399	314
Bulletin 400	448
Bulletin 401	314
Bulletin 403	669
Bulletin 404	763
Control Series Bulletin 115	444
FM–11	714
FM–12	598
FM–13	658

MICHIGAN STATION:	Page
Special Bulletin 131 (rev)	68
Special Bulletin 142 (rev.)	668
Special Bulletin 182 (rev.)	217
Special Bulletin 225 (rev.)	445
Special Bulletin 321	601
Special Bulletin 322	385
Special Bulletin 323	318
Special Bulletin 324	598
Special Bulletin 325	418
Technical Bulletin 179	219
Technical Bulletin 180	87
Technical Bulletin 181	247
Technical Bulletin 182	477
Technical Bulletin 183	725
Technical Bulletin 184	411
Technical Bulletin 186	674
Technical Bulletin 187	670
Circular 185	358
Circular 186	475
Circular 187	211
Circular 188	675
Quarterly Bulletin, vol. 25, No. 4, May 1943	535, 536, 537, 538, 544, 547, 563, 578, 583, 584, 589, 594, 595, 598, 599
Annual Report 1942	147, 509

MINNESOTA STATION:	
Bulletin 362	133
Bulletin 363	213
Bulletin 364	198
Bulletin 365	533
Bulletin 367	58
Bulletin 368	659
Bulletin 369	741
Technical Bulletin 155	570
Annual Report 1942	16, 142

MISSISSIPPI STATION:	
Bulletin 372	268
Bulletin 373	57
Bulletin 374	353
Bulletin 375	312
Bulletin 376	61
Bulletin 378	442
Mississippi Farm Research, vol. 6—	
No. 2, Feb. 1943	31, 51, 68, 82, 116, 122
No. 3, Mar. 1943	180, 204, 214, 215, 267
No. 4, Apr. 1943	413, 419, 439, 442, 463, 471, 495, 496, 510

MISSISSIPPI STATION—Continued. Page

Mississippi Farm Research, vol. 6—Continued.

No. 5, May 1943 418, 419, 439, 468, 493, 500
No. 6, June 1943 633, 657, 679, 706, 707, 717, 734, 775, 779

MISSOURI STATION:

Bulletin 456 120
Bulletin 457 (Annual Report 1940) 502, 509
Bulletin 458 417
Bulletin 459 467
Bulletin 460 497
Bulletin 461 471
Bulletin 462 472
Bulletin 463 463
Bulletin 464 440
Bulletin 465 485
Bulletin 466 470
Bulletin 467 598
Bulletin 468 594
Bulletin 469 519
Bulletin 470 542
Bulletin 473 730
Research Bulletin 351 140
Research Bulletin 352 435
Research Bulletin 353 437
Research Bulletin 354 409
Research Bulletin 355 435
Research Bulletin 356 409
Research Bulletin 357 436
Research Bulletin 358 459
Research Bulletin 359 518
Research Bulletin 360 537
Research Bulletin 361 540
Research Bulletin 362 583
Research Bulletin 363 417
Research Bulletin 364 583
Research Bulletin 365 602
Research Bulletin 366 584
Research Bulletin 367 577
Research Bulletin 368 577
Research Bulletin 369 751
Circular 245 102
Circular 246 73
Circular 247 418
Circular 248 290
Circular 249 103
Circular 250 105
Circular 251 58
Circular 252 124

MISSOURI STATION—Continued. Page

Circular 253 105
Circular 254 58
Circular 255 492
Circular 256 469
Circular 257 482
Circular 258 441
Circular 259 463
Circular 260 463
Circular 261 482
Circular 262 463
Circular 263 463
Circular 264 482
Circular 265 463
Circular 266 446
Circular 267 482
Circular 268 465
Circular 269 472
Circular 270 574
Circular 271 569
Circular 272 745

MISSOURI FRUIT STATION:

Bulletin 31 544
Circular 30 542

MONTANA STATION:

Bulletin 406 260
Bulletin 409 290
Bulletin 410 356
Bulletin 411 308
Bulletin 412 505
Bulletin 413 712
Bulletin 414 657
Bulletin 415 724
Circular 169 355
Circular 170 378
Circular 171 439
Circular 172 490
Circular 173 602
Circular 174 501
Circular 175 760
War Circular 1 615, 775
War Circular 2 444
War Circular 3 444

NEBRASKA STATION:

Bulletin 345 470
Bulletin 346 597
Bulletin 348 777
Research Bulletin 129 436
Research Bulletin 131 633
Circular 50 (rev.) 666
Circular 72 93
Circular 73 441
Annual Report [1942] 728, 779

NEVADA STATION:	Page
Bulletin 163	269
Bulletin 164	471

NEW HAMPSHIRE STATION:	
Bulletin 344	602
Bulletin 345 (Report 1941–42)	281, 312, 313, 315, 368, 369, 372, 405
Circular 63	310
Circular 65	389
Circular 66	738

NEW JERSEY STATIONS:	
Bulletin 698	457
Bulletin 701	260
Bulletin 704	354
Bulletin 705	303
Circular 444	70
Circular 453	51
Circular 454	578
Circular 455	340
Circular 456	185
Circular 457	315
Circular 458	445
Circular 459	562
Circular 460	542
Circular 461	604
Circular 462	722
Circular 463	762
Circular 464	760
Circular 465	437
Circular 466	722
Circular 467	764
Circular 468	762
Circular 469	761
Inspection Series 1	66
Inspection Series 2	31
Inspection Series 3	102
Inspection Series 4	92
Inspection Series 5	31
Inspection Series 6	66
Inspection Series 7	102
Inspection Series 8	214
Hints to Poultrymen, vol. 30—	
No. 2, Dec. 1942-Jan. 1943	380
No. 3, Feb.–Mar. 1943	723
Plant Disease Notes, vol. 20—	
No. 8, Nov. 1942	84
No. 9, Dec. 1942	87
No. 11, Feb. 1943	321

NEW MEXICO STATION:	Page
Bulletin 297	262
Bulletin 298	243
Bulletin 299	260
Bulletin 300	204
Bulletin 301	311
Bulletin 302	213
Bulletin 303	466
Bulletin 304	534
Bulletin 305	719
Bulletin 306	774
Bulletin 307	737
Bulletin 308	666
Annual Report 1942	413, 503, 510

[NEW YORK] CORNELL STATION:	
Bulletin 786	391
Bulletin 787	218
Bulletin 788	233
Bulletin 789	290
Memoir 249	49
Memoir 284	321
Mimeograph Bulletin 5	129
Mimeograph Bulletin 7	131
Mimeograph Bulletin 8	392
Mimeograph Bulletin 9	392
Farm Research, vol. 9, No. 2, Apr. 1, 1943	307, 309, 310, 311, 313, 321, 331, 342, 344, 354, 385
Annual Report 1942	485, 510

NEW YORK STATE STATION:	
Bulletin 704	332
Bulletin 705	666
Bulletin 706	446
Technical Bulletin 266	111
Technical Bulletin 267	330
Technical Bulletin 268	476
Circular 123 (rev.)	760
Circular 126 (rev.)	715
Circular 127 (rev.)	713
Circular 136 (rev.)	142
Circular 147 (rev.)	483
Circular 176 (rev.)	572
Circular 178 (rev.)	760
Circular 197	110
Farm Research, vol. 9, No. 2, Apr. 1, 1943	307, 309, 310, 311, 313, 321, 331, 342, 344, 354, 385.

NORTH CAROLINA STATION:	
Bulletin 336	54
Bulletin 337	63

NORTH CAROLINA STATION—Con. Page
Bulletin 338 53
Bulletin 340 596
Technical Bulletin 74 630
Progress Report RS–1 744
Research and Farming, vol. 1, Progress Report 2, Mar. 1943 .... 418, 439, 454, 465, 471, 483, 486, 491, 495, 498.

NORTH DAKOTA STATION:

Bulletin 319 .... 455, 463
Bulletin 320 438
Circular 67 155
Bimonthly Bulletin, vol. 5—
  No. 3, Jan. 1943 .... 43, 54, 60, 66, 106, 107, 116, 121, 129
  No. 4, Mar. 1943 .... 306, 307, 308, 348, 381, 401
  No. 5, May 1943 .... 410, 440, 444, 446, 455, 501, 510

OHIO STATION:

Bulletin 638 127
Bulletin 639 497
Bulletin 640 519
Bulletin 641 655
Bimonthly Bulletin 220 .... 26, 67, 68, 86, 102, 107, 121, 128, 130
Bimonthly Bulletin 221 .... 290, 312, 313, 314, 316, 331, 340, 352, 389
Bimonthly Bulletin 222 .... 629, 659, 668, 672, 732, 733, 750, 779
Special Circular 62 (rev.) 406
Special Circular 63 (rev.) 259
Special Circular 66 37
Special Circular 67 54

OKLAHOMA STATION:

Bulletin 244, Supplement 352
Bulletin 263 484
Bulletin 264 132
Bulletin 265 389
Bulletin 266 540
Bulletin 267 494
Bulletin 268 494
Technical Bulletin 17 500
Technical Bulletin 18 539
Circular 107 441
Circular 108 53
Circular 109 227
Circular 111 354
Circular 112 469

OKLAHOMA STATION—Continued. Page
Circular 113 718
Current Farm Economics, vol. 16—
  No. 1, Feb. 1943 121
  No. 2, Apr. 1943 382

OREGON STATION:

Bulletin 414 357
Bulletin 415 386
Circular 146 379
Circular 147 343
Circular 148 335

PENNSYLVANIA STATION:

Bulletin 436 and Supplementary Tables 751
Bulletin 436, Methodological Supplement 751
Bulletin 437 336
Bulletin 438 312
Bulletin 439 735
Bulletin 440 665
Bulletin 441 374
Bulletin 442 314
Bulletin 443 309

PUERTO RICO UNIVERSITY STATION:

Bulletin 61 (Span. ed.) 494
Bulletin 62 (Span. ed.) 496
Bulletin 63 (Span. ed.) 493
Agricultura Experimental—
  Vol. 2, No. 6, Nov.-Dec. 1942 .... 154, 214, 215
  Vol. 3, No. 1, Jan.-Feb. 1943 .... 214, 230, 243
Journal of Agriculture of the University of Puerto Rico, vol. 26—
  No. 3, July 1942 218
  No. 4, Oct. 1942 .... 309, 316, 346
Mimeographed Report 20, Sups. 8–12 129
Mimeographed Report 21 387

RHODE ISLAND STATION:

Bulletin 285 752
Bulletin 286 770
Bulletin 287 599
Miscellaneous Publication—
  5 (rev.) 308
  15 126
  16 396

South Carolina Station:	Page
Circular 64	411
Annual Report 1942	542, 543, 544, 597, 612, 613, 616

South Dakota Station:	
Bulletin 364	125
Bulletin 365	600
Circular 41	125
Circular 42	492
Circular 43	66
Circular 44	490
Circular 45	662
Circular 46	475
Rural Sociology Pamphlets 73, 74, 79, 81–97	391
Rural Sociology Pamphlet 98	
Rural Sociology Pamphlets 99–105	391
Rural Sociology Pamphlet 106	391
Rural Sociology Pamphlets 107–108	391
Annual Report 1942	405, 406

Tennessee Station:	
Bulletin 183	263
Bulletin 184	420
Circular 84	445
Circular 85	468
Agricultural Economics and Rural Sociology Department—	
Monograph 145	128
Monograph 146	124
Monograph 147	124
Monograph 148	388
Monograph 149	385
Monograph 150	388
Monograph 151	383
Monograph 152	388
Monograph 153	38
Monograph 154	73
Annual Report 1941	266, 268, 26

Texas Station:	
Bulletin 617	597
Bulletin 618	26
Bulletin 620	46
Bulletin 621	257
Bulletin 622	24
Bulletin 623	8
Bulletin 624	122
Bulletin 626	66

Texas Station—Continued.	Page
Circular 98	67
Circular 99	678
Circular 100	31
Circular 101	128

Utah Station:	
Bulletin 266	265
Bulletin 303	383
Bulletin 305	410
Bulletin 306 (Biennial Report 1941–42)	482, 501, 507, 510
Bulletin 307	432
Bulletin 308	736
Bulletin 309	737
Circular 118	483
Circular 119	309
Mimeograph Series 291	744
Mimeograph Series 292	289
Farm and Home Science, vol. 4—	
No. 1, Mar. 1943	51, 71, 102, 108, 126, 130
No. 2, June 1943	541, 569, 598, 610, 617

Vermont Station:	
Bulletin 494	468
Bulletin 499	680
Bulletin 500	718
Pamphlet 1	723

Virginia Station:	
Bulletin 343	365
Bulletin 344	705
Bulletin 345	308
Bulletin 346	308
Bulletin 347	342
Bulletin 348	440
Technical Bulletin 82	322
Technical Bulletin 83	520
Technical Bulletin 84	521
Rural Sociology Report 24	266
Rural Sociology Report 25	262

Virginia Truck Station:	
Bulletin 109	82

Washington Station:	
Bulletin 424	123
Bulletin 425 (Annual Report 1942)	142
Bulletin 426	261
Bulletin 427	262
Bulletin 428	738
Bulletin 429	738
Popular Bulletin 167	214

Washington Station—Continued. Page
Popular Bulletin 168 ... 217
Popular Bulletin 169 ... 259
Popular Bulletin 170 ... 668
Popular Bulletin 171 ... 696
Popular Bulletin 172 ... 763
V Circular 1 ... 493
V Circular 2 ... 459
V Circular 3 ... 418
V Circular 4 ... 443
V Circular 5 ... 445
V Circular 6 ... 473
V Circular 7 ... 439
V Circular 8 ... 455
V Circular 9 ... 468
V Circular 10 ... 477
V Circular 11 ... 493
V Circular 12 ... 494
V Circular 13 ... 745

West Virginia Station:
Bulletin 307 (Biennial Report 1941-42) ... 510

West Virginia Station—Con. Page
Circular WS 13 ... 522
Circular WS 14 ... 584
Mimeographed Circular 47 ... 496
Mimeographed Circular 48 ... 743

Wisconsin Station:
Bulletin 456 (Annual Report 1942, part 1) ... 269
Bulletin 457 ... 311
Bulletin 458 ... 212
Bulletin 459 ... 290
Bulletin 460 (Annual Report 1942, part 2) ... 617
Research Bulletin 143 (rev.) ... 126
Research Bulletin 145 ... 80

Wyoming Station:
Bulletin 257 ... 105
Bulletin 258 ... 243
Bulletin 259 ... 358
Bulletin 260 ... 464
Bulletin 261 ... 440

UNITED STATES DEPARTMENT OF AGRICULTURE PUBLICATIONS ABSTRACTED

Technical Bulletin— Page
839 ... 456
840 ... 461
842 ... 316
844 ... 168
845 ... 540
847 ... 348
848 ... 464
849 ... 553
850 ... 711

Farmers' Bulletin—
1044 (rev.) ... 66
1134 (rev.) ... 471
1454 (rev.) ... 133
1539 (rev.) ... 537
1656 (rev.) ... 61
1752 (rev.) ... 669
1853 ... 25
1873 (rev.) ... 616
1920 ... 67
1927 ... 220
1929 ... 56
1930 ... 345
1931 ... 378
1933 ... 376
1934 ... 555
1935 ... 60
1936 ... 315

Farmers' Bulletin—Continued. Page
1937 ... 457
1938 ... 462
1939 ... 310
1940 ... 317
1942 ... 536

Statistical Bulletin 78 ... 221

Circular—
221 (rev.) ... 241
390 (insert) ... 565
438 (rev.) ... 482
664 ... 95
665 ... 62
666 ... 438
667 ... 258
668 ... 318
670 ... 390
671 ... 242
672 ... 588
673 ... 301
674 ... 552
676 ... 311
677 ... 557

Miscellaneous Circular 12 (rev.) ... 102

Leaflet—
127 (rev.) ... 666
142 (rev.) ... 68

Leaflet—Continued. Page
  203 (rev.) 66
  231 259
  232 379
  233 303
Miscellaneous Publication—
  60 (abr. ed.) 142
  490 220
  498 556
  499 686
  501 680
  505 138
  508 545
  509 73
  510 406
  511 344
  512 129
  513 536
  514 306
  515 406
  516 417
  517 488
  518 535
  519 681
  520 507
  522 723
Bibliographical Bulletin 1 710
Foreign Agriculture Bulletin 2 127
Hydrologic Bulletin 5 518
Crops and Markets, vol. 20—
  No. 1, Jan. 1943 129
  No. 2, Apr. 1943 390
Agricultural Statistics, 1942 129
Atlas of Agricultural Information: Appalachian Region 382
Report of the Secretary of Agriculture, 1942 141
BUREAU OF AGRICULTURAL CHEMISTRY AND ENGINEERING:
  ACE-142, parts 1 and 2 283
  ACE-189 284
  ACE-190 284
AGRICULTURAL CONSERVATION AND ADJUSTMENT ADMINISTRATION:
  Report 1942 141
BUREAU OF AGRICULTURAL ECONOMICS:
  Agricultural Finance Review, vols. 1-5, May 1938-Nov. 1942 746
BUREAU OF AGRICULTURAL ECONOMICS—Continued. Page
  F. M. 37 218
  F. M. 38 261
  F. M. 39 262
  F. M. 40 385
  Rural Life Studies No. 5 498
  Rural Life Studies No. 6 261
  A Partial List of Publications on Farm Labor Requirements by Commodities 130
  An Economic Appraisal of Dry-Land Farming on the Zuni Plateau, New Mexico 123
  Estimated Lags Between Farm, Wholesale, and Retail Prices for Selected Foods 747
  Farm Wage Rates, Farm Employment, and Related Data 493
  Grazing Capacity as Determined by Range Survey 243
  Material Bearing on Parity Prices 747
  Maximum Prices of Agricultural Commodities and Their Products 601
  Net Farm Income and Income Parity Summary, 1910-41 122
  Net Farm Income and Income Parity Summary, 1910-42 747
  Railroad Facilities for Handling Livestock at Shipping Points in the Corn Belt Region 496
  The Farm Labor Situation on Wisconsin Dairy Farms 130
  Use of Condition Reports and Weather Data in Forecasting the Yield Per Acre of Wheat 516
  Using Resources To Meet Food Needs 739
AGRICULTURAL MARKETING SERVICE:
  [Annual Reports on Tobacco Statistics, 1939-41] 390
  Annual Report on Tobacco Statistics, 1942 601

Page

BUREAU OF DAIRY INDUSTRY:

The Dairy Industry of Colombia 496
The Dairy Industry of El Salvador 496

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE:

Review of United States Patents Relating to Insect Pest Control, vol. 15, Nos. 1–12, Jan.–Dec. 1942 92
Report of the Chief, 1942 141

OFFICE OF EXPERIMENT STATIONS:

Report on the Agricultural Experiment Stations, 1942 778

EXTENSION SERVICE:

Report of Cooperative Extension Work in Agriculture and Home Economics, 1941–42 268

FARM CREDIT ADMINISTRATION:

Bulletin 50 261
Bulletin 52 742
Miscellaneous Report 61 389
Miscellaneous Report 64 747
Miscellaneous Report 65 598
W. C. 3 741
W. C. 4 749
W. C. 5 497
W. C. 6 748
W. C. 7 748
W. C. 8 742
Cooperative Research and Service Division Miscellaneous Report 62 126
Soils Manual for the Seventh Farm Credit District, With Crop Requirements Supplement 25

FOOD DISTRIBUTION ADMINISTRATION:

CS–1 601
[NFC–1] 766
NFC–2 766
NFC–3 766
NFC–4 756

Page

OFFICE OF FOREIGN AGRICULTURAL RELATIONS:

Agriculture in the Americas, vol 3—

No. 2, Feb. 1943 71
No. 3, Mar. 1943 142
No. 4, Apr. 1943 219
No. 5, May 1943 432
No. 7, July 1943 544
No. 8, Aug. 1943 679

Foreign Agriculture, vol. 7—

No. 2, Feb. 1943 127
No. 3, Mar. 1943 127
No. 4, Apr. 1943 495
No. 5, May 1943 495
No. 6, June 1943 495
Foreign Agriculture Report 8 679

FOREST SERVICE:

Caribbean Forester, vol. 4, No. 3, Apr. 1943 545, 548
Tropical Forest Experiment Station Occasional Paper 2 220

LIBRARY:

Library List 3, Sup. 1 261
Library List 4 744
Library List 6 743

BUREAU OF PLANT INDUSTRY:

[Soil Survey Report]—

Series 1934—

No. 23 518
No. 24 632

Series 1935—

No. 24 170

Series 1936—

No. 20 289

Series 1937—

No. 6 632
No. 7 518
No. 9 632

Series 1938—

No. 3 518
No. 4 518

Plant Disease Reporter—

Vol. 27—

No. 1, Jan. 15, 1943 74
No. 2, Feb. 1, 1943 74
No. 3–4, Feb. 15–Mar. 1, 1943 74
Sup. 140, Mar. 1, 1943 75

	Page
BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING:	
Plant Disease Reporter—	
Vol. 26, No. 24, Index, 1942	449
Vol. 27—	
No. 5–6, Mar. 15–Apr. 1, 1943	319
No. 7–8, Apr. 15–May 1, 1943	319
No. 9, May 15, 1943	548
No. 10–11, June 1–15, 1943	548
No. 12–13, July 1–15, 1943	681
Sup. 141, Apr. 1, 1943	454
Sup. 142, May 1, 1943	450
BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING—Continued.	
Soil Conditions Affecting Herbicidal Action of Chlorates: A Literature Review	213
SOIL CONSERVATION SERVICE:	
Physical Land Survey No. 27	632
Physical Land Survey No. 28	170
Physical Land Survey No. 29	632
SCS–TP–39, Sup. 2	628
SCS–TP–43	289

JOURNAL OF AGRICULTURAL RESEARCH

	Page
Vol. 66—	
No. 3, Feb. 1, 1943	84, 89, 103
No. 4, Feb. 15, 1943	82, 84
No. 5, Mar. 1, 1943	35
No. 6, Mar. 15, 1943	33, 59
No. 7, Apr. 1, 1943	224, 229
No. 8, Apr. 15, 1943	300, 402
No. 9, May 1, 1943	280, 281, 299
No. 10, May 15, 1943	446, 506
No. 11, June 1, 1943	439, 465, 499
No. 12, June 15, 1943	520, 527
Vol. 67—	
No. 1, July 1, 1943	556, 570, 575
No. 2, July 15, 1943	621, 660, 688
No. 3, Aug. 1, 1943	680, 682, 713

EXPERIMENT STATION RECORD

Vol. 89 July 1943 No. 1

RECENT WORK IN AGRICULTURAL SCIENCE [1]

AGRICULTURAL AND BIOLOGICAL CHEMISTRY

Further biochemical methods, revised by C. H. Werkman et al. (*Pure Cult. Study Bact., 10 (1942), No. 4, Leaflet 6, 9. ed., pp. 20, illus. 1*).—This leaflet deals with preparation of bacterial juices; relation to free oxygen; cleavage of carbohydrates, alcohols, and glucosides; determination of dehydrogenases; cleavage of proteins and their products; action on inorganic nitrogenous compounds; and action on erythrocytes. There are 54 references.

Spectrography in agricultural research, J. S. McHargue and E. S. Hodge. (Ky. Expt. Sta.). (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 2, pp. 509–510*).—This is a very brief general discussion, with which is submitted a tabulation of the contents of horse tissues with respect to 14 elements.

Apparatus for crystallization and filtration at low temperatures. F. W. Quackenbush and H. Steenbock. (Univ. Wis.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 9, pp. 736–737, illus. 2*).—Apparatus of two types is described and illustrated by diagrammatic drawings. Both units are enclosed in heavily insulated chambers and can be cooled with solid carbon dioxide ("dry ice") to temperatures as low as —75° C. Material crystallizing out at a desired temperature is transferred to a suction funnel included with the other enclosed and cooled equipment. In one unit the crystalline magma is driven from a flask fitted with a motor-driven stirrer by means of air pressure, in the other the flask without stirrer is turned to pour its contents into the suction funnel by an outside handle attached to a revolvable shaft carrying a clamp which holds the neck of the flask. These devices were used in the separation of linoleic from oleic acid.

Glass valve pressure regulator, M. J. Caldwell and H. N. Barham. (Kans. Expt. Sta.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 6, p. 485, illus. 1*).—This apparatus, the construction of which is shown in a diagram, involves the sealed-chamber principle. It consists of two glass chambers, communicating across the bottom through a mercury pool and across the top through a stopcock. Floating on the mercury in one arm is a lead-weighted float, carrying a glass rod having at its free end a ground-glass tip which serves as a needle to close the ground opening in the exhaust line. The valve parts are held in alignment by a close-fitting sleeve surrounding the float stem. The vertical motion of the valve assembly is limited to about 1 mm. by the valve seat above and a glass stop below. The dimensions of the regulator may be varied within wide limits, but it is essential that the weight of the float be sufficient to insure the opening of the valve against the pressure differential at the valve seat. A weight slightly over 10 gm. is required to open a 1-mm.^{2} opening against a pressure differential of one atmosphere. Temperature variations within the sealed chamber directly affect the regulator precision. Under proper operating conditions, however, the apparatus has been found capable of controlling pressure either above or below atmospheric pressure to about 1 mm. of mercury.

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[1] The publications abstracted in these columns are seldom available for distribution by the Office of Experiment Stations. In general, application should be made to the Office of Information of the U. S. Department of Agriculture, Washington, D. C., for publications of the Department; to the directors of the State agricultural experiment stations, as listed on page 3 of the cover of this issue, for publications of the several experiment stations; and to publishers of books and journals for material issued by them. Microfilms and photostatic copies, the latter legible without magnifying equipment, may be purchased from the Library, U. S. Department of Agriculture, Washington, D. C. Rates and other details are explained in a previous issue (E. S. R., 87, p. 324).

An efficient column suitable for vacuum fractionation: Concentric tube type, S. A. Hall and S. Palkin. (U. S. D. A.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 10, pp. 807–811, illus. 5*).—The design of an apparatus of the concentric tube type is described in detail and is shown in drawings. The results of efficiency trials showing satisfactory operation are reported.

Leakproof stopcock for regulation of take-off during distillation, M. S. Newman. (Ohio State Univ.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, p. 902, illus. 1*).—The device described consists essentially of a vertically placed stopcock of which the plug has side entrance and end delivery openings, the barrel being expanded at the top to form a mercury cup seal and continued at the bottom into a delivery tube having a moderate fall.

Pressure wash bottle for volatile solvents, L. W. Charkey and D. V. Zander. (Colo. Expt. Sta.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, p. 857, illus. 1*).—A third tube, to be closed by the thumb when liquid is to be driven from the flask, is placed in the stopper, and a slow stream of air from the compressed air line is passed through the flask. To prevent evaporation of highly volatile wash liquids, a U-tube is attached to the inner ends of the inlet and the thumb tube by short rubber tube sleeves, of which one has a small opening to admit air into the flask when the thumb tube is closed.

Insulation for necks of wash bottles, J. Mizroch (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, p. 845*).—The neck of the wash bottle is snugly wound with a wetted thin asbestos strip about 2 in. wide, and the bottle is set aside to dry overnight. A bakelite lacquer is then brushed on the dry asbestos, allowed to air-dry for an hour, and baked at 110° C. for 4 hr.

An oil manometer-manostat to control column throughput, S. A. Hall and S. Palkin. (U. S. D. A.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 8, pp. 652–654, illus. 3*).—The manostatic control described utilizes mineral oil of very low vapor pressure as the only manostatic liquid. The movement of the meniscus, resulting from pressure variations corresponding to variations in column throughput, actuates a photoelectric relay which controls the heat input to the still pot. The results of some tests on throughput constancy when this device was used as shown. Working drawings are included.

The electron microscope, E. F. Burton and W. H. Kohl (*New York: Reinhold Pub. Corp., 1942, pp. 233, illus. 152*).—This is a popular work, the first few chapters explaining in elementary terms the fundamentals of the behavior of visible light in vision, refraction and the formation of images by lenses, and the elementary facts of the interrelationship among electricity, magnetism, electron streams, and light. The electron miscroscope itself is then treated with similar simplicity with respect both to theory and mechanical structure. Both the electrostatic and the compound magnetic types are described.

Agar-agar as a coagulant for barium sulfate, E. J. Bogan and H. V. Moyer. (Ohio State Univ.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 849–850, illus. 3*).—It was found that positively charged barium sulfate, which is obtained when sulfate is precipitated by an excess of barium ions, can be coagulated by the addition of a trace of agar-agar, approximately 1 mg. of agar-agar causing the flocculation of an ordinary analytical precipitate of barium sulfate obtained in the determination of sulfate. Negatively charged barium sulfate obtained in the determination of barium is not appreciably improved by the addition of agar-agar, but this precipitate, as a rule, causes little difficulty in filtration. Creeping seemed to be completely eliminated from precipitates coagulated with agar-agar.

Stability of the cupric-ammonia color system, J. P. MEHLIG. (Oreg. State Col.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, p. 903*).—The data given show that the color of the cupric-ammonia system is practically unchanged after a period of 57 weeks. Any action of ammonia on the glass is negligible when Pyrex containers are used.

A rapid Kjeldahl digestion method using perchloric acid, L. P. PEPKOWITZ, A. L. PRINCE, and F. E. BEAR. (N. J. Expt. Stas.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 856–857*).—After from 10 to 15 minutes' digestion of the sample in sulfuric acid with selenium oxychloride as catalyst, the authors cool the digest and add 0.5 or 1 cc. of 35-percent perchloric acid and heat without boiling for from 10 to 15 min. more, clearing of the digest usually requiring no more than this time. Because of the small quantity and the dilution of the perchloric acid, no violent reactions were produced. Time and some reagents were found to be saved.

Kjeldahl nitrogen determination: A rapid wet-digestion micromethod, L. P. PEPKOWITZ and J. W. SHIVE. (N. J. Expt. Stas.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 914–916*).—This is a micromethod based upon a principle the same as that of the method for larger samples above described by Pepkowitz, Prince, and Bear.

Determination of ammonia by a diffusion method, A. N. PRATER, E. J. COWLES, and R. P. STRAKA. (U. S. D. A.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 9, pp. 703–705, illus. 2*).—In a modification of the method of Conway and Byrnes (E. S. R., 70, p. 444), the authors placed the absorbing acid as hanging drops on the under surface of flat cover glasses, using a saturated solution of boric acid in glycerol (about 28 gm. of the acid in 100 gm. of glycerol) and titrating with 0.01 N hydrochloric acid. The samples were made alkaline with a saturated solution of sodium metaborate and potassium chloride or with 4 percent sodium hydroxide. The stronger alkaline was unsuited to most biological material. Petri dishes were successfully substituted for the special diffusion vessels.

Improvements in the colorimetric microdetermination of phosphorus, C. P. SIDERIS (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 9, pp. 762–764, illus. 1*).—The author heats the phosphate solution, acidified with sulfuric acid on a water bath, and extracts with N-butyl alcohol. Metallic tin and hydrochloric acid are preferred as a reducing agent to stannous chloride solutions in hydrochloric acid, the latter often giving a greenish rather than a pure blue color. The reduction and colorimetry are carried out on the butyl alcohol solution.

Elimination of fluoride interference in the molybdenum blue reaction, L. T. KURTZ. (Univ. Ill.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, p. 855*).—The fluoride removal is unnecessary when boric acid is added to the fluoride-containing aliquot before the phosphate determination is made. The boric acid forms with fluoride the fluoborate ion, and thus prevents interference by the fluoride ion. Under these conditions, evaporation with perchloric acid may be omitted and accompanying errors avoided.

Polarographic determination of potassium, sodium, and lithium, I. ZLOTOWSKI and I. M. KOLTHOFF. (Univ. Minn.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 6, pp. 473–477, illus. 6*).—Tetraethylammonium hydroxide was found a more suitable supporting electrolyte in the determination of alkali metals than the tetramethyl compound. A solution of tetraethylammonium hydroxide must be allowed to stand for from 5 to 10 days and then be filtered before use as a supporting electrolyte. The filtrate is stable for a relatively long time.

Potassium and sodium can be determined polarographically with an accuracy within 3 percent in a medium of 50 percent ethanol. The concentration of tetraethylammonium hydroxide must be at least 50 times greater than that of the alkali ions. Lithium is best determined in a medium of 80 percent ethanol, in which both sodium and potassium yield well-defined diffusion waves. In 50 percent ethanol the diffusion current measured in mixtures of potassium and sodium within the experimental error is equal to the sum of the diffusion currrents of the individual components. Lithium hydroxide in a medium of 50 percent ethanol can be used as a supporting electrolyte for the determination of potassium and sodium or of the sum of both if the concentration of lithium hydroxide is between 40 and 100 times greater than that of the other alkali ions. In a mixture of potassium, sodium, and lithium with tetraethylammonium hydroxide as supporting electrolyte in a medium of 80 percent ethanol two diffusion waves are obtained. The first corresponds to the sum of sodium and potassium, and the second to the concentration of lithium. Therefore, the sum of the concentrations of potassium and sodium and the concentration of lithium in a mixture can be found from one single current-voltage curve.

Photometric determination of potassium, I. W. Wander. (Ohio Expt. Sta.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 6, pp. 471–472, illus. 1*).—Potassium is determined photometrically by oxidation of the dipotassium sodium cobaltinitrite precipitate with standard potassium dichromate in the presence of sulfuric acid and estimation of the resulting colored solution in a photoelectric colorimeter. A filter of which the maximum transmission was at about $\gamma=425$ mμ was found suitable.

Adaptation of an indirect method for potassium to the photoelectric colorimeter, C. P. Sideris (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 10, pp. 821–822, illus. 1*).—The determination of potassium as potassium sodium cobaltinitrite with nitroso R salt (disodium salt of 1-nitroso-2-hydroxy-3,6-naphthalenedisulfonic acid) can be made with much greater precision using a photoelectric colorimeter with appropriate light filters instead of an optical colorimeter. The range of concentrations best suited is from 0.5 to 15 μg.

Rapid volumetric method for determination of sulfate ion, M. Randall and H. O. Stevenson. (Univ. Calif.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 8, pp. 620–621, illus. 1*).—A method for titrating the excess barium after sulfate precipitation by means of sodium pyrophosphate proved unsatisfactory in that as the alcohol content increases, the amount of pyrophosphate ion required to titrate the barium increases rapidly. No constant value for the barium could be ascertained. By using disodium hydrogen phosphate as the titrating agent, however, a satisfactory and rapid method for sulfate and barium ions was produced. Barium chloride was added in excess to a sulfate-containing solution and the excess titrated to the methyl red end point with standard disodium hydrogen phosphate in an alcohol and water medium. It was found that with ordinary precision, and in the hands of a competent analyst, the method may be expected to give results within 0.5 percent and require from 10 to 15 min. Ammonium compounds must not be present, however, because of the solubility of barium hydrogen phosphate in the presence of the ammonium ion.

Improved semimicrodetermination of sulfur in organic materials, J. F. Mahoney and J. H. Michell (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 1, pp. 97–98*).—Sulfur combined in a variety of nonvolatile organic compounds was oxidized to inorganic sulfate by a sodium peroxide-carbon fusion, and the sulfate ion was estimated by titration with standard barium chloride solution using tetrahydroxyquinone as an internal indicator. No special apparatus was required, and from 0.5- to 5-mg. quantities of combined sulfur were determined with speed and accuracy.

Spectrophotometric determination of magnesium by titan yellow, E. E. LUDWIG and C. R. JOHNSON (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 895–897*).—The authors report that various natural and treated waters and concentrated magnesium solutions may be analyzed rapidly and accurately for magnesium by a spectrophotometric adaptation of the titan yellow method. For most practical purposes the interferences likely to be encountered do not appreciably affect the results. The procedure is recommended for control use.

Volumetric determination of iron and titanium, W. M. MCNABB and H SKOLNIK (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 9, pp. 711–713*).—In mixtures of titanous and ferrous irons in diluted sulfuric acid the titanium compound could be selectively oxidized by aeration if mercuric chloride were added as catalyst. A method for the determination of both irons was based on complete reduction of the mixed solution in a zinc reductor, aeration oxidation of the titanium, and titration of the iron with potassium permanganate. The fully reduced mixture was also titrated and the titanium determined by difference.

Colorimetric determination of iron with 2,2′-bipyridyl and with 2,2′2″-terpyridyl, M. L. MOSS and M. G. MELLON. (Purdue Univ.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 862–865, illus. 5*).—Although terpyridyl was found somewhat more sensitive than bipyridyl with respect to the ferrous ion and less sensitive to interference by the silver ion, its advantages are hardly significant enough to consider in ordinary work. Terpyridyl gives a cobalt complex sufficiently colored to be useful in the determination of cobalt. Bipyridyl and phenanthroline give practically no color with cobalt but form highly colored copper and molybdenum compounds. Silver interferes seriously with the bipyridyl and phenanthroline methods for iron, although 100 p. p. m. may be present if terpyridyl is used. Cobalt and copper cause somewhat more interference with terpyridyl than with the other two reagents. The wave lengths of maximum absorption for phenanthroline, bipyridyl, and terpyridyl are 510, 522, and 552 mμ, respectively, and the hues vary accordingly. Terpyridyl has a more distinct band than the others, and its maximum lies in the spectral region most favorable for visual measurements.

A satisfactory method for the determination of cobalt with terpyridyl has been studied. 1,10-Phenanthroline, on the other hand, may be used for determining copper, and its ferrous complex is a valuable oxidation-reduction indicator. Ferrous complexes of bipyridyl and terpyridyl are not sufficiently stable in hot acid to compare favorably with the "ferroin" indicators. The versatility of these cyclic bases containing the N–C–C–N grouping seems to justify further investigation as new compounds become available. A procedure similar to those of Hill (E. S. R. 64, p. 712) and of Kohler, Elvehjem, and Hart (E. S. R., 76, p. 582), except that hydroxylamine was found the best reagent for reducing the ion to the ferrous state, is described.

Spectrophotometric determination of iron with o-phenanthroline and with nitro-o-phenanthroline, J. P. MEHLIG and H. R. HULETT. (Oreg. State Col.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 869–871*).—A spectrophotometric method for the determination of iron depends upon reducing the iron with hydroxylamine and measuring the light transmittancy at 490 and 505 mμ of the colored solution produced by either *o*-phenanthroline or nitro-*o*-phenanthroline.

The results agree closely with those obtained by the dichromate titrimetric method. The method is easily carried out and requires no longer, possibly little less, time than usual titrimetric methods. Very few diverse ions interfere with the color, and a wide range in pH values is possible. Reducing the iron with stannous chloride is not recommended.

Determination of copper with 8-quinolinecarboxylic acid, J. R. Gilbreath and H. M. Haendler (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 866–867*).—8-Quinolinecarboxylic acid was found to be suitable as an analytical reagent for the determination of copper in dilute acetic acid solution. The method described has an accuracy of about 0.1 percent. Copper can also be determined rapidly in the presence of an appreciable amount of cadmium or zinc with an accuracy of about 0.15 percent. Silver and gold form insoluble precipitates under the given conditions and will interfere if present. An entire determination involves only about 30 man-min.

Methods for determination of copper and zinc in soil, G. D. Sherman and J. S. McHargue. (Ky. Expt. Sta.). (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 2, pp. 510–515*).—Methods in which the copper is determined colorimetrically as the diethyl-dithiocarbamate and zinc as the diphenylthiocarbazone complex are described in working detail.

A micromethod for determination of arsenic, E. Cahill and L. Walters (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 1, pp. 90–91, illus. 1*).—For the determination of 1 µg. of arsenic, thread as an arsenic detector in glass capillary tubes gave a more sensitive, more constant, and more definite stain than the usual paper strips. When No. 24 thread was used in a 0.5-mm. bore capillary and No. 8 thread in a 1-mm. bore capillary, the former thread gave more constant stains. It is believed, therefore, that for the range of 1 µg. of arsenic, the closer the arsenic detector fits its glass container the more constant the stain. A simple frame and handle made from a singular piece of 5-mm. glass rod was used as a holder for impregnating the thread with the mercuric bromide solution. This device and its use are shown in a drawing.

Determination of arsenic in organic compounds: An iodometric semimicroprocedure, H. A. Slovitek, W. M. McNabb, and E. C. Wagner (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 6, pp. 516–519*).—A semimicromethod for the determination of arsenic in organic compounds involves decomposition of the sample by action of hot concentrated sulfuric and nitric acids, precipitation of elementary arsenic by hypophosphorous acid, solution of the filtered and washed arsenic in excess bromine, and iodometric determination of excess halogen by titration with standard sodium arsenite in a solution buffered with disodium phosphate. The results indicate the accuracy and range of applicability of the method. The procedure was found convenient, moderately rapid, and applicable in presence of halogens.

Quantitative decomposition of organic bromine and iodine compounds by the lime-fusion method, W. M. MacNevin and G. H. Brown. (Ohio State Univ.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, p. 908*).—The method has sufficient accuracy for the determination of the number of halogen atoms in the organic molecule.

Determination of fluorine and other halogens in organic compounds, P. J. Elving and W. B. Ligett. (Purdue Univ.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 6, pp. 449–453, illus. 3*).—A method for the analysis of organic fluoro compounds is presented and depends upon decomposition of the compound by heating with an alkali metal in an evacuated sealed tube at moderately elevated temperature and determination of the resulting alkali fluoride by standard methods. The same technic serves for the analysis of chloro, bromo, and iodo compounds.

Photometric determination of silica in the presence of phosphates, M. C. Schwartz. (La. State Univ. et al.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 893–895, illus. 1*) —A form of the colorimetric method based on the formation of silicomolybdic acid, with the use of oxalic acid to destroy any phosphomolybdic acid formed, is described.

Semimicrodetermination of carbon: Using the Van Slyke-Folch oxidation mixture, R. M. McCready and W. Z. Hassid. (Univ. Calif.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 6, pp. 525–526, illus. 2*).—The authors describe a simple apparatus for the semimicrodetermination of carbon in organic compounds, using an oxidation mixture containing chromium trioxide, potassium iodate, sirupy phosphoric acid, and fuming sulfuric acid having a 20-percent free sulfur trioxide content. This wet oxidation method gave theoretical yields with all the organic substances tried, and the accuracy of the procedure is equal to that of dry combustions. In routine work single determinations require about 30 min.

A rapid method for estimating carbon contained in plant tissue extracts, E. M. Emmert and C. S. Waltman. (Ky. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 41 (1942), pp. 245–250, illus. 1*).—A method, based on the fact that when plant extracts are treated with fuming sulfuric acid enough heat is generated to produce a brown solution that can be measured with a colorimeter, is outlined, and the results of a test on extracts of apple and peach twigs are presented.

Further developments in the photometric determination of wheat protein, L. Zeleny, M. H. Neustadt, and H. B. Dixon. (U. S. D. A.). (*Cereal Chem., 19 (1942), No. 1, pp. 1–11, illus. 2*).—A photometric method previously reported (E. S. R., 86, p. 155) for the determination of protein in wheat flour has been applied, with minor modifications, to the analysis of wheat. Theoretically the method differentiates to a considerable degree between gluten and nongluten protein and thus comes closer to being a measure of gluten protein than of total protein. Experimental evidence substantiating this theory is presented.

The quantitative estimation of both cystine and cysteine in mixtures, M. X. Sullivan, W. C. Hess, and H. W. Howard (*Jour. Biol. Chem., 145 (1942), No. 2, pp. 621–624*).—Cystine and cysteine when estimated by the cyanide-cystine procedure are equivalent mole for mole in chromogenic value; any variation observed is due to impurity in the cysteine, to irregularity in water content, or to oxidation. Cystine and cysteine when estimated by the amalgam-cyanide procedure are equivalent in chromogenic value milligram for milligram, since 1 mole of cystine gives 2 moles of cysteine. With proper attention to the purity of the cystine and cysteine standards, it is relatively easy to estimate cystine and cysteine quantitatively, singly or in mixtures.

Refractometric determination of casein in skim milk, J. G. Brereton and P. F. Sharp. (Cornell Univ.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 872–874, illus. 1*).—The casein in 25 gm. of skim milk is precipitated with dilute acetic acid at from 40° to 42° C., the precipitate is washed and dissolved in 0.1 N sodium hydroxide, and the refraction is compared with a 0.1–N sodium hydroxide solution containing no casein. The refractive index of the solution was shown to be incased by 0.00181 when 1 gm. of purified casein is dissolved in 100 cc. of 0.1–N sodium hydroxide.

This method has the distinct advantage that if a control solution containing no casein is run for comparison, the concentration of alkali need be known only approximately and the temperature may range from about 20° to 30°, provided that the unknown and the control solution contain the same amount of alkali and the refraction of both is determined at the same temperature. The average deviation between results obtained with the refractometer procedure and the A. O. A. C. method was 0.04 percent of casein, and the maximum error was

0.06 percent when applied to 21 samples of skim milk of a wide range of composition.

Determination of soybean flour in sausages and other meat products: A protein separation method, J. Bailey (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 10, pp. 776–781*).—Glycinin, or a part of the total glycinin content bearing a fixed relation to the quantity of soybean meal present, is separated from other proteins present after removal of fats, smoke components, etc., by a series of nine steps of extraction, salting out, re-solution, and a final precipitation of the difficultly coagulable glycinin by copper sulfate added to the alkaline solution. The copper complex is washed, dried, and weighed.

A micro method for determining test weight, C. O. Swanson. (Kans. Expt. Sta.). (*Cereal Chem., 19 (1942), No. 4, pp. 468–470*).—The author reports experiments which show that a microtest-weight method using suitably designed cups is sufficiently accurate when only small samples of grain are available.

The utility of micro methods of test-weight determination with hard red spring wheat, R. H. Harris and L. D. Sibbitt. (N. Dak. Expt. Sta.). (*Cereal Chem., 19 (1942), No. 4, pp. 458–467, illus. 5*).—The authors describe procedures for the estimation of the test weight per bushel of samples too small to be tested by the Official standard method. These methods include the weight in grams of (1) 16 cc. of wheat, (2) 4 cc. of wheat, (3) 16 cc. of finely ground wheat meal, (4) 4 cc. of finely ground wheat meal, and (5) 500 kernels.

The 16-cc. method gave the most satisfactory results in respect to the degree of correlation with the standard method. The 4-cc. method was the next best. Both these methods have distinct utility for the determination of test weight from small samples of wheat. The methods employing ground wheat meal are not highly correlated with test weight and would not be satisfactory for prediction purposes. The weight of 500 (or 1,000) kernels would be still less reliable for finding bushel weight. Comparative determinations made by two operators on the same series of wheats with the 16-cc. method showed significant differences between operators.

Suitable charts or tables from which the standard test weight per bushel may be read off directly from microresults in grams can be constructed.

The evaluation of malt for use as a flour supplement, E. Kneen and R. M. Sandstedt. (Nebr. Expt. Sta.). (*Cereal Chem., 19 (1942), No. 2, pp. 181–195, illus. 1*).—Six-hr. gassing-power values of sugar-deficient doughs were not affected by β-amylase but did respond to additions of the α-component. The increase in gas production per increment of α-amylase was relatively great for small increments and diminished at higher levels. Malt extract was treated to give two preparations, one low in α- and high in β-amylase, the other high in α- and deficient in β-amylase. The baking responses of these were compared with that of the original extract. The method of baking eliminated gas production as a variable, but in all instances loaf-volume response was proportional to the increment of α-amylase added. Extracts from 24 malts were used to supplement flours and resulting increases in gassing power and loaf volume determined. Both of these responses were very highly correlated with the α-amylase activity of the extract. Correlation between loaf volume and saccharogenic activity of the malt was significant. Throughout the range of α-amylase supplement used in the experimental bakes the times required to proof to constant height showed no significant variation. The data indicate that consideration of α-amylase activity is of major importance in evaluating diastatic supplements of flour.

Identification of sugars by microscopic appearance of crystalline osazones, W. Z. Hassid and R. M. McCready. (Univ. Calif.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 8, pp. 683–686, illus. 20*).—Not more than 5 mg. of sugar is needed. The unknown osazone may be compared with one prepared simultaneously from known sugars or with photomicrographs of osazones of various sugars. By observing the crystal form of the osazone under the low power of the ordinary microscope, a particular sugar may be tentatively identified. Further confirmation from melting point determinations, or from a study of the optical properties if a petrographic microscope is available, is desirable. Photomicrographs of a number of sugar osazones are shown.

Determination of moisture in starch and its modifications, L. Sair and W. R. Fetzer (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 843–845*).—Either the toluene distillation procedure or the vacuum-oven method at 100° C. is suitable as a reference method for determining moisture in starch and its modifications. Rapid oven procedures using temperatures as high as 140°, based on these methods, should prove reliable for most starch products. Care must be exercised, however, in drying highly acid modified starch and the hypochlorite-oxidized products at temperatures higher than 100°.

Interpretation of viscosity measurements on starch pastes, B. Brimhall and R. M. Hixon. (Iowa Expt. Sta.). *Cereal Chem., 19 (1942), No. 4, pp. 425–441, illus. 9*).—The various methods for interpreting viscosity measurements as applied to starch pastes are reviewed. The application of these methods is illustrated with data obtained by the authors at different temperatures, concentrations, and pressures with a capillary viscometer. Complexities and difficulties introduced by the heterogeneity of the starch paste system are discussed, and measurement of hot viscosity rather than cold viscosity is recommended to avoid the additional complications introduced by cooling the paste. The quantitative determination of gel strength or elasticity as a measure of the solid characteristics of a starch is considered to be a valuable adjunct to viscosity, which is a measure of its fluid characteristics.

Measuring the concentration of dissolved oxygen in dairy products: A voltammetric method, G. H. Hartman and O. F. Garrett. (N. J. Expt. Stas.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 8, pp. 641–644, illus. 3*).—The dropping mercury electrode method of measuring the concentration of dissolved oxygen was applied successfully to milk. The relationship between the concentration of dissolved oxygen in milk and the magnitude of the galvanometer deflections was found to be linear. The concentration of oxygen in milk could be determined at a potential ranging from 0.8 to 1.2 v. The slight variations in the solids content of normal milks introduced no significant errors. The statistical analyses of the data on the air-saturated milks show that the method is highly reliable.

Determination of blood in packing-house by-products, R. Reiser and G. S. Fraps. (Tex. Expt. Sta.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 851–853*).—The sample is dissolved in sodium hydroxide, pyridine is added, color (from hemoglobin) is developed by reduction with sodium hydrosulfite, and the difference in the color density with and without reduction is read at 550 mμ in a spectrophotometer. The intensity of the color is in proportion to the concentration. The maximum color is at 562 mμ with fresh blood and 550 mμ with commercial dried blood, showing a change due to heating. Hemoglobin is partially destroyed by autoclaving blood, so that commercial dried blood (though part has been drained off before drying) averages 58 percent hemoglobin compared with 73.6 percent for fresh cow blood on a dry basis. The results of the analysis can be expressed either as dried blood or as hemoglobin. Commercial tankage (7 samples) showed from 11.4 to 41.9 percent of dried blood. Three samples of meat and bone scraps were indicated to contain 6.3, 12.8, and 26.5 percent of dried blood, while the other 10 contained, according to the new procedure, less than 4.1 percent. The results are probably low.

Ash determinations in foods with an alkaline balance.—III, Decomposition curves of ashes from foods. IV, Effect of water on ash weights, H. J. Wichmann (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 2, pp. 478–484, illus. 6; pp. 484–494, illus. 6*).—Following up his work on the decomposition of pure carbonates (E. S. R., 84, p. 730), the author proceeds, in paper III, to a discussion of the decomposition of the carbonate components of the ash itself, and, in paper IV, to a study of hydration effects.

From experiments reported in paper III it is concluded that the previously observed weight increases, after carbonation of ashes with solutions of ammonium carbonate or carbon dioxide, must be due to more than one cause. At least one explanation for some of the observed facts may be found in the affinity of alkaline earth phosphates for water and the reluctance with which they part with it even at fairly high temperatures. The reactions of alkali carbonates with alkaline earth phosphates at ashing temperatures may also have an influence on ash weights.

Paper IV records an investigation of the decomposition of hydrated magnesium and calcium sulfates, volatilization of water from hydrated precipitated basic calcium phosphate, decomposition of hydrated trimagnesium phosphate, and decomposition of alkaline earth hydroxides. At 260°–300° C. certain compounds found in ashes do retain water of hydration. Even normal ashing temperatures of 500°–550° do not remove all of this water from precipitated basic calcium or trimagnesium phosphates, and ashes containing them in appreciable quantity do not, therefore, represent an anhydrous equilibrium. Whether the conditions of ashing may be so fixed as to insure a definite and reasonably stable equilibrium, followed by anhydrous carbonation or by some other device to change oxides to carbonates, remains to be determined.

An improved method for the estimation of vitamin B_1 in foods by the thiochrome reaction, M. Swaminathan (*Indian Jour. Med. Res., 30 (1942), No. 2, pp. 263–272*).—The simple method described for the estimation of thiamin in foods is based on the thiochrome reaction. The main features of the procedure developed to eliminate several sources of error included (1) no preliminary adsorption, since this was found to be incomplete and variable in the case of some foods such as legumes and yeast; (2) removal of coloring matter and interfering fluorescent and reducing substances by treatment with basic lead acetate, after hydrolysis of the cocarboxylase present to the free vitamin; (3) removal of the preformed thiochrome and other remaining fluorescent materials by a preliminary washing of the aqueous extract with isobutyl alcohol; (4) correction of the vitamin values for the loss of thiamin occurring in the procedure, by determining the recovery of added thiamin; and (5) regulation of the amount of ferricyanide required for oxidation to obtain the maximum yield of thiochrome. Values obtained by application of the method to 19 foods (cereals, legumes, cabbage, carrots, liver, and yeasts) gave values which corresponded well with reported values obtained by biological methods.

Effect of p-aminobenzoic acid on the microbiological assay for nicotinic acid, H. Isbell (*Jour. Biol. Chem., 144 (1942), No. 2, pp. 567–568*).—Treatment of acid hydrolyzates of casein with activated charcoal to remove traces of nicotinic acid appeared to remove some other growth factor for the strain of *Lactobacillus arabinosus* used, reducing in proportions varying from one type of activated carbon to another the acid production of the organism in media made up from such treated hydrolyzates. The compounds pimelic acid, inositol, choline hydrochloride, thymus nucleic acid, adenosine, and xanthine all restored normal growth of the organism when they were added in very small quantities. *p*-Aminobenzoic acid, however, was effective in quantities one one-thousandth of the minimum effective quantity of any of the above compounds. It is concluded that *p*-aminobenzoic acid should be added to the media prepared from charcoal-treated hydrolyzates intended for use in assays for nicotinic acid or biotin with the organism here dealt with.

Collaborative study of the applicability of microbiological and chemical methods to the determination of niacin (nicotinic acid) in cereal products, D. MELNICK (*Cereal Chem., 19 (1942), No. 5, pp. 553–567*).—This collaborative study, together with ones for thiamin and riboflavin, was initiated by the Research Corporation, New York City. The procedures formulated for collaborative study were drawn up on the basis of preliminary work of 11 collaborators using several different microbiological methods of assay, and 9 collaborators working with various chemical procedures, as applied to four test samples, including a whole-wheat flour, a white flour, an air-dried whole-wheat bread made from the first flour, and an air-dried, nicotinic acid-enriched bread made from the white flour.

Mild aqueous extraction without preliminary enzymic digestion removed all the nicotinic acid from the cereal products, as it appeared from the results of the chemical methods which subjected this extract to strong acid hydrolysis, but yielded according to microbiological assays smaller nicotinic acid values than those obtained for the acid or alkaline extracts. Microbiological assays conducted on extracts of the latter type yielded reproducible maximum values for nicotinic acid. The greater nicotinic acid content of the acid or alkaline extracts was due, apparently, not to greater extraction efficiency but to hydrolysis of an unknown compound which was otherwise unavailable to the micro-organism. The unknown compound, presumably a nicotinic acid derivative, is believed to be biologically available to man, but definite proof awaits biological assay. Since the chemical procedures involved strong acid hydrolysis of the samples or extracts, it is probable that the unknown compound was included in the values obtained by chemical assay. Tests on both acid and alkaline extracts gave proof that trigonelline, which is resistant to acid hydrolysis but can be hydrolyzed by alkali, does not interfere in the microbiological assays.

Collaborative microbiological and chemical procedures, based on the preliminary work, are described. The chemical method was based largely on the procedures of Melnick and Field (E. S. R., 86, p. 11) and Dann and Handler (E. S. R., 87, p. 14); the Bina-Thomas-Brown procedure (E. S. R., 87, p. 13) was found to cause variable and low results. Results of the collaborative study, using the collaborative procedures, showed these to yield reproducible values and good recoveries of nicotinic acid and to be specific for the vitamin in the assay of cereal products. Furfural, produced from pentosans in wheat products, reacted with the reagents in the chemical procedure for the determination of nicotinic acid. However, in the collaborative method interference due to the presence of furfural in the final test solution was negligible. No loss of nicotinic acid occurred in the production of bread from whole-wheat flour or nicotinic acid-enriched white flour.

Determination of nicotinic acid in blood cells and plasma, J. R. KLEIN, W. A. PERLZWEIG, and P. HANDLER (*Jour. Biol. Chem., 145 (1942), No. 1, pp. 27–34, illus. 1*).—The cells from oxalated blood are laked and deproteinated with tungstic acid, and the filtrate, obtained following centrifugation, is hydrolyzed by heating with concentrated HCl on the water bath for 1½ hr. After cooling, neutralization, and adjustment of the pH, the nicontinic acid in the solution is estimated by means of the color produced by its reaction with CNBr and *p*-methylaminophenol sulfate (elon), color measurements being made by photoelectric colorimeter. The optical density of the color of the treated sample is corrected for the optical density of the color of the blank, and the corrected reading is compared with readings of the color obtained from known amounts of nicotinic acid treated in the same manner as the hydrolyzate. For determinations on the plasma a protein-free filtrate is prepared and hydrolyzed as in the case of the cells, but the hydrolyzate, adjusted to a pH between 0.5 and 1.0, is treated with Lloyd's reagent for adsorption of the nicotinic acid, which is subsequently removed by washing the Lloyd's reagent with 0.5 M KOH. The resulting solution is cleared with lead nitrate, and excess lead is removed by treatment with solid tripotassium phosphate. The solution, after adjustment of pH, is used for the determination of nicotinic acid by the method applied in the assay of the cells. Although analyses of plasma filtrates by the procedure used for the cells was not satisfactory for normal levels, the procedure gave satisfactory indication of the level as affected by the ingestion of relatively large quantities of nicotinic acid. The average concentration of nicotinic acid in the cells of normal man and dogs was 13γ and 16γ per cubic centimeter, respectively; the average concentration in the plasma of normal human subjects was 0.3γ per cubic centimeter. The concentration of nicotinic acid in the blood cells was not decreased in blacktongue or pellagra.

A calculated blank for the estimation of thiamin by the fermentation method.—C, Enriched bread, G. J. LAEMMLE and O. W. BARLOW (*Cereal Chem., 19 (1942), No. 5, pp. 540–546, illus. 2*).—The ratio of sulfite blank to the total fermentation stimulating substances in a series of 100 enriched bread samples assayed for thiamin by the yeast fermentation procedure of Schultz et al. (E. S. R., 85, p. 727) was found to be 0.238. Substitution of this empirical factor for the two individual sulfite blanks required in the original procedure doubled the capacity of the method and brought about a considerable reduction in assay time. Trials were made in which a number of breads were analyzed by the usual procedure with the employment of the sulfite blank, and again with the omission of the blank but with its calculation as 0.238 times the fermentation-stimulating substance. The results obtained with the calculated blank were in close agreement with those obtained in the usual way.

A comparison of four methods for determining vitamin C with a 25-day, weight-response bioassay, C. F. DUNKER, C. R. FELLERS, and W. B. ESSELEN, JR. (Mass. Expt. Sta.) (*Food Res., 7 (1942), No. 4, pp. 260–266, illus. 1*).—Weight-response curves of guinea pigs to graded quantities of ascorbic acid indicated that the response was proportional to the ascorbic acid intake. Based on this finding and on a second criterion, degree of protection from scurvy, a bio-assay method was devised in which healthy 250- to 300-gm. guinea pigs growing at a normal rate were divided into groups or 5 or 10 animals (containing an equal number of each sex), which were placed on the basal vitamin C-free ration of Sherman et al. (E. S. R., 46, p. 865) and fed various levels of the food under test. After 25 days the response was compared with that of control groups receiving graded doses of pure ascorbic acid. The food supplement giving a response comparable to a particular control level of ascorbic acid and approximately the same protection from scurvy was considered as containing an equivalent amount of ascorbic acid. This method, the standard bio-assay method of Sherman et al., the short curative method of Harris and Ray (E. S. R., 72, p. 731), the 2,6-dichlorophenolindophenol titration method as modified by Mack and Kertesz (E. S. R., 77, p. 151), and the iodine titration method of Stevens were compared in determining the ascorbic acid content of canned tomato juice, canned grapefruit juice, fresh spinach, and fresh sweet corn. The dye-titration method and the 25-day weight-response bio-assay method gave good checks with the standard Sherman bio-assay method. The iodine titration method, however, gave values which were high in most cases, while the Harris-Ray method gave results which differed widely from those by the Sherman method and did not permit accurate detection of small differences in ascorbic acid content. Since the chemical methods do not differentiate the biologically active ascorbic acid from the inactive forms, it is suggested that the weight-response bio-assay method should be of particular aid in evaluating the antiscorbutic properties of food products containing the inactive forms now often added as antioxidants.

The application of absorption spectra to the study of vitamins, hormones, and coenzymes, R. A. Morton (*Boston: Jarrell-Ash Co.; London: Adam Hilger, 1942, 2. ed., pp. 226, illus. 82*).—This edition (E. S. R., 74, p. 296) is concerned primarily with methods of experimentation and with the interpretation of absorption spectra toward the elucidation of structure and detection and determination of the vitamins, hormones, and coenzymes. This material, presented against a background of information concerning the distribution and the chemical, physical, and physiological properties of these substances, makes wide use of published material which has contributed to advances in absorption spectrophotometry.

Report on chlorophyl and carotene in plant tissue, E. J. Benne. (Mich. Expt. Sta.) (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 3, pp. 573–591, illus. 2*).—This article reviews briefly methods suggested by various investigators for overcoming difficulties involved in analyzing fresh crop plants for carotene or chlorophyll, and presents the results of experimental studies on several phases of this problem. Methods employed for removing other pigments from the carotene in 95 percent ethanol extracts of different plant tissues included saponification of chlorophyll by refluxing 30 min. with KOH (A. O. A. C. (E. S. R., 85, p. 5)) or $Ba(OH)_2$ (Petering et al. (E. S. R., 83, p. 438)), and removal of xanthophyll with 90 percent methanol; simultaneous removal of chlorophyll and xanthophyll with a chromatographic column of dicalcium phosphate (Moore (E. S. R., 85, p. 583)); and removal of colored pigments from the petroleum benzine solutions of carotene by shaking with $MgCO_3$ (Fraps et al. (E. S. R., 86, p. 151)). In these trials carotene was evaluated in petroleum benzine solutions by means of a photelometer. Each of the several procedures gave duplicate carotene values in close agreement. All methods gave values in good agreement for carotene in fresh parsley and bluegrass and fresh and dried spinach; the dicalcium phosphate technic with fresh and dried alfalfa and clover and the $MgCO_3$ treatment with dried clover leaves and alfalfa meal gave appreciably lower results than those by the A. O. A. C. procedure. This discrepancy suggested the need for further comparison of the methods for removing noncarotene impurities from carotene in petroleum benzine solutions.

A study of the effect of storage on the carotene content of fresh vegetables showed how profoundly moisture content affected the magnitude of carotene values and emphasized that changes in moisture content must be rigidly guarded against in the handling of samples. Thus, uncut spinach plants held under dripping water lost neither moisture nor carotene in 48 hr.; in the next 24 hr., after removal from the drip, moisture loss was more rapid than that of carotene, causing an apparent increase of 35 percent in carotene content. When calculated to the original moisture basis, however, a slight loss of carotene was evident. Similarly, carrots stored intact for 65 days lost sufficient moisture to cause an apparent increase of almost 100 percent in carotene content; when calculated to the original moisture basis, however, this increase was not apparent, although most of the carotene was still present.

Chlorophyll determinations in freshly prepared and stored extracts (85 percent acetone and 95 percent alcohol) of plant materials showed progressive destruction of the chlorophyll to occur upon holding the extracts in the light at room temperature; in the dark, at room temperature, but particularly at refrigerator temperature, this destruction was very slight. These results indicated that if the evaluation of chlorophyll concentrations is delayed after extraction from plant tissues with alcohol or acetone, the extracts should be placed in the dark, preferably in a refrigerator.

In the reduction of fresh samples to a fine state of division by the Waring Blendor, splashing, loss of volatile extractants, and difficulty of quantitative transfer of contents were experienced. These difficulties were overcome in part by modification of the size, shape, and closure of the container. Hand grinding with sand, both with alcohol and acetone extraction, gave somewhat better extraction of chlorophyll than maceration by the Blendor or any of its modifications. Likewise, hand grinding permitted better extraction of carotene from spinach and bluegrass than did the Blendor, although from alfalfa the reverse was true, possibly because of the more rapid destruction of the pigment during the hand grinding. It is suggested that additional research is needed to determine the type of extractor and the manner of extraction most effective for different kinds of plant tissues.

Report on carotene, A. R. Kemmerer. (Tex. Expt. Sta.). (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 4, pp. 886–891*).—A sample of alfalfa feed and one of yellow corn were subjected to collaborative study, the former for determination of crude and pure carotene by the tentative method previously described (E. S. R., 87, p. 7), and the latter for cryptoxanthin and carotene by complete and abridged chromatographic methods described in detail in the present report. The satisfactory agreement of results on the alfalfa prompted the recommendation that the method tentatively adopted for the determination of crude carotene in hays and dried plants be adopted officially, and that the adsorption method for pure carotene (here described), employing activated $MgCO_3$ as the adsorbent, be adopted as tentative. The complete chromatographic method, involving the use of an adsorption column of MgO which served to separate impurities, cryptoxanthin, and α-, β-, and K carotenes, worked well in the hands of some collaborators, but was found difficult by others and did not give good agreement between all collaborators. The abridged chromatographic method, employing an adsorption column of $MgCO_3$ which separated impurities, cryptoxanthin, and carotene but did not resolve the carotene into its isomers, gave results indicating the method to be quite reliable. It is recommended that the complete and abridged chromatographic methods presented for the determination of carotene and cryptoxanthin in yellow corn be further studied.

The water-soluble riboflavin-boron complex, D. V. Frost (*Jour. Biol. Chem., 145 (1942), No. 2, pp. 693–700*).—Preparations of soluble riboflavin-boron complexes containing up to 0.3 percent riboflavin in solution were obtained by methods involving protracted heating under carefully controlled pH. These stable solutions, containing about 25 times the amount of riboflavin naturally soluble in water, were suitable for injection. The fact that rather large molecular excesses of boron compound were needed to produce stable solutions suggested a physicochemical relationship involving an equilibrium between a soluble ester form of riboflavin-boron complex and free insoluble riboflavin. The slightly increased acidity of the riboflavin-boron solutions and the dependence of solubility on pH indicated the presence of a highly dissociated ester type of linkage in which the monobasic nature of the boric acid was enhanced. Synthesis of riboflavin monoborate and tetrabenzoylriboflavin was accomplished by methods described. The effect of pH on the specific rotation of *d*-riboflavin, *l*-araboflavin, and boron complexes formed by them was also studied.

Protection of ascorbic acid during its extraction from plant tissues, M. E. Reid. (U. S. D. A. et al.). (*Food Res., 7 (1942), No. 4, pp. 288–294*).—An investigation was made of the ascorbic acid yield from various plant tissues as affected by (1) cooking and (2) extraction with different volumes and concentrations of metaphosphoric acid. The results obtained indicated that the preservation of vitamin C during extraction from tissues of high oxidative activity depended (1) upon the concentration of the acid used in the early phases of grinding and (2) upon sufficient volume to furnish coverage of all parts of the sample at the moment the first crushing of cells began. Spinach and kale had a relatively low, soybeans and cowpeas high, and carrot, banana, and potato intermediate requirements for metaphosphoric acid. Cooking tended to preserve the vitamin C in tissues of high oxidative activity. Although similar values were obtained for fresh and cooked samples, the former required a considerably higher amount of metaphosphoric acid. Rokusun and Nanda varieties of vegetable soybeans used in this study at the edible stage as a green vegetable contained, respectively, 32 and 34 mg. of ascorbic acid per 100 gm., while cowpeas of the Groit variety analyzed at a young stage contained approximately 40 mg. per 100 gm. For the other tissues analyzed, the ascorbic acid values, expressed as milligrams per 100 gm. of fresh tissue, were reported as follows: Carrots 5.58, Green Mountain potatoes 18.3, bananas 10.6, spinach 78.8, and kale 216.0.

Determination of rotenone: Improvements in the gravimetric method, S. I. Gertler. (U. S. D. A.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 897–898*).—Extraction time was shortened by refluxing the sample with the solvent for a short time. This procedure also permits the use of samples up to 200 gm., as well as mixtures of powdered roots with sulfur and most inert ingredients. The purification of the crude rotenone was also modified, and several unnecessary steps were omitted.

Nicotine silicotungstates, L. N. Markwood. (U. S. D. A.). (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 2, pp. 474–478*).—Silicoduodecitungstic acid of the composition of $4H_2O.SiO_2.12WO_3.4H_2O$ (4-acid) forms with nicotine a microcrystalline granular salt, whereas the nicotine salt of the acid $4H_2O.SiO_2.12WO_3.22H_2O$ (22-acid) is lamellar. The faster filtration of the granular salt suggested the substitution of the 4-acid in determining nicotine. Under the conditions of the A. O. A. C. method, the quality of nicotine remaining unprecipitated by the former acid is more than twice that left unprecipitated by the latter. The difference is perhaps small enough to be disregarded in a macrodetermination, but since washing accentuates the difference and a loss of several percent can occur, depending on the nicotine concentration and the degree of washing, it is believed that the 4-acid should not be used where the highest accuracy is desired.

Electrophoresis of proteins and the chemistry of cell surfaces, H. A. Abramson, L. S. Moyer, and M. H. Gorin (*New York: Reinhold Pub. Corp., 1942, pp 341+, illus. 155*).—The studies on which this book was based were designed to aid the investigation of the surface chemistry of living cells. The development of the theory is outlined in addition to the more empirical aspects. The contents are general principles of electric migration in liquids; experiments in the nineteenth century; methods; dissolved and adsorbed proteins and related surfaces; electrokinetic theory and migration of charged particles; electric mobility and the calculation of the net charge; serum and plasma; antibodies, antigens, and their reactions; interactions of proteins in mixtures; interactions of proteins at surfaces; enzymes and hormones; miscellaneous electrophoretic investigations of biological interest; latex; and surface chemistry of cells.

Bactericidal and fungicidal properties of a crystalline protein isolated from unbleached wheat flour, L. S. Stuart and T. H. Harris. (U. S. D. A.). (*Cereal Chem., 19 (1942), No. 2, pp. 288–300, illus. 2*).—The purified, crystallized hydrochloride of a protein separated from unbleached wheat flour has both bactericidal and bacteriostatic activity "in vitro." No "in vivo" activity could be demonstrated when the substance was tested in mice against pneumococci and streptococci. In vitro activity was greatest against gram-positive organisms, but there was also some activity against gram-negative organisms. When tested against *Saccaromyces cerevisiae* this protein brought about the death of the yeast cells in concentrations of 0.005 mg. per cubic centimeter or higher. Similar results were obtained with the pathogenic fungi *Debaryomyces nadiformis* and *Endomycopsis albicans.* However, tests on mycelial fungi failed to show any fungicidal activity. In vitro tests failed to show any hemolytic, bacteriolytic, or yeast-cell lytic action.

Effect on small laboratory animals of the injection of the crystalline hydrochloride of a sulfur protein from wheat flour, E. J. Coulson, T. H. Harris, and B. Axelrod. (U. S. D. A. et al.). (*Cereal Chem., 19 (1942), No. 2, pp. 301–307, illus. 4*).—The bactericidal protein discussed in the preceding paper was investigated as a possible protective against disease organisms but was found toxic to the experimental animals when injected, though harmless by mouth in relatively large doses. It appeared that the minimum lethal dose of the original hydrochloride for mice was about 15 mg. per kilogram of body weight when the substance was injected intraperitoneally.

The synthesis of α-amino acids from substituted acetoacetic esters, K. E. Hamlin, Jr., and W. H. Hartung. (Univ. Md.). (*Jour. Biol. Chem., 145 (1942), No. 2, pp. 349–357, illus. 10*).—The synthesis of α-amino acids through the nitrosation of appropriately substituted acetoacetic esters followed by hydrolysis and hydrogenation is described. Alanine, α-aminobutyric acid, norvaline, norleucine, isoleucine, aspartic acid, glutamic acid, phenylalanine, and o-methyltyrosine were synthesized in good yield by this method. *o*-Methyltyrosine was demethylated and converted into tyrosine.

The polarographic behavior of histidine and certain other amino-acids, E. R. Roberts (*Abs. in Minnesota Sta. Rpt. 1942, p. 22*).—Histidine, when analyzed polarographically, exhibits three characteristic effects, two of which, under specific conditions, are proportional to the concentration of histidine. One of these effects persists and retains proportionality in the presence of arginine and lysine. This "wave" may be utilized for analytical purposes. Cystine determinations must be made on freshly prepared solutions. Serine, tryptophan, and tyrosine do not lend themselves to polarographic estimation.

Technics in the synthesis of porphyrindin, H. A. Lillevik, R. L. Hossfeld, H. V. Lindstrom, R. T. Arnold, and R. A. Gortner. (Minn. Expt. Sta.). (*Jour. Organic Chem., 7 (1942), No. 2, pp. 164–168, illus. 1*).—Necessary precautions, not directly specified in previous literature, have been developed and added to earlier methods. An improvement in the yield of nitrile from acetoxime was made possible by cold room technics and by extractions with petroleum ether instead of recrystallization. It was found that the most difficult step (imino ether hydrochloride) gave excellent yields when extreme care was taken to insure anhydrous conditions. Minor modifications in the last four steps have been made to avoid the failures resulting from insufficient practice and knowledge of procedure. Knowledge gained from the literature and from experiment has been incorporated into a readily workable method.

On the identity of the so called crassulacean malic acid with isocitric acid, G. W. Pucher and H. B. Vickery. (Conn. [New Haven] Expt. Sta.). (*Jour. Biol. Chem., 145 (1942), No. 2, pp. 525–532*).—An examination of the literature of the so-called crassulacean malic acid has shown that there is every likelihood that early workers with this substance had more or less impure specimens of isocitric acid in hand. The composition of the salts and other derivatives of isocitric acid is so closely similar to that of the similar compounds of malic acid that confusion could scarcely be avoided unless strictly homogeneous preparations were obtained and analyzed with the utmost accuracy. Furthermore, although isocitric acid was known as an optically inactive product of synthesis throughout the period during which discussions of crassulacean malic acid occasionally appear in the literature, the optically active isomer had not been encountered and there was no information available upon the strikingly characteristic behavior of this substance.

Constituents of pyrethrum flowers.—XV, Presence of the cumulated system in the pyrethrolone side chain, F. B. LaForge and F. Acree, Jr. (U. S. D. A.). (*Jour. Organic Chem., 7 (1942), No. 5, pp. 416–418*).—In order to compare the halogen addition reactions with those of an authentic 2,3-pentadienyl derivative, 1-cyclohexyl-2,3-pentadiene was prepared and examined with respect to its behavior toward bromine in two types of solvent. The results of the halogen addition and of the subsequent reduction were found to be parallel to those obtained with pyrethrone. The absorption spectrum of pyrethrone was compared with that of 1-cyclohexyl-2, 3-pentadiene, with results which exclude the possibility of a double bond in position one, while the formation of acetaldehyde on ozonization fixed one double bond in position three, at the same time excluding position four and leaving only position two as the location of the remaining double bond. The presence of a three-membered ring is excluded as an unlikely possibility because this group does not easily hydrogenate, nor does it readily add bromine.

Purification of rennin from commercial rennin extract: Properties of purified product, C. L. Hankinson and L. S. Palmer. (Minn. Expt. Sta.). (*Jour. Dairy Sci., 25 (1942), No. 4, pp. 277–283*).—A stable purified rennin sol was prepared from a commercial rennet extract by means of an isoelectric precipitation procedure. One part of dry rennin coagulated 72,300,000 parts of fresh raw skim milk at pH 5.75–5.80 (obtained by added $CaCl_2$) in 10 min. at 40° C., which was an activity 4.55 times that of the dry organic matter of the original extract. The peptic activity, measured by a method which estimates quantitatively 10 μg. crystalline pepsin, was only 6.25 percent of that of the original dry organic mixture. The rennin was therefore 99.77 percent "pure" from the standpoint of peptic activity. The purified rennin exhibited the properties of a globulin. Its isoelectric point in 16.7 percent NaCl solution was pH 4.5. The rennin sol, freed from NaCl by dialysis, showed a progressive increase in negative ζ potential from pH 6.0 to 7.5, and at pH 6.5 showed about the same negative ζ potential as calcium caseinate particles. Rennin and calcium caseinate, therefore, do not exhibit opposite electropotentials at the pH of milk.

An introduction to the chemistry of cellulose, J. T. Marsh and F. C. Wood (*London: Chapman & Hall, 1942, 2. ed., pp. 512+, illus. 106*).—Though this book is intended to serve "as a guide to the younger chemists who are entering those branches of our great industries which are concerned with cellulose," the purely scientific aspect of the subject is also presented throughout the book. The 22 chapters are divided into 5 parts, dealing with occurrence and general properties, constitution and structure, dispersed cellulose, modified cellulose, and derivatives. An appendix contains density tables, list of patent specifications, and other data.

The hemicelluoses of forage plants, E. Bennett. (Mass. Expt. Sta.). (*Jour. Biol. Chem., 146 (1942), No. 2, pp. 407–409*).—The polyuronide hemicelluloses of sheep fescue (*Festuca ovina*) and sweet vernal grass (*Anthoxanthum* *odoratum*) in the vegetative state were isolated, and, when hydrolyzed, yielded a uronic acid, *l*-arabinose, and *d*-xylose in the approximate molar ratio of 1:0.2:15.7 and 1:2.9:9.3, respectively. The degree of hydration of the two products appeared to differ considerably. The species containing the more highly hydrated product had the greater original moisture content and contained the larger percentage of *l*-arabinose.

Oxidized cotton, an immunologically specific polysaccharide, M. Heidelberger and G. L. Hobby (*Natl. Acad. Sci. Proc., 28 (1942), No. 12, pp. 516–518*).

Catalytic hydrogenation of cotton hull fiber, H. R. Henze, B. B. Allen, and B. W. Wyatt (*Jour. Organic Chem., 7 (1942), No. 1, pp. 48–55*).—From 300 gm. of cotton hull fiber there was formed by the action of 8.11 moles of hydrogen at 250° [C.] and under pressures of 325–380 atmospheres in the presence of 7 percent of sodium hydroxide and Raney nickel 3.31 moles of gaseous hydrocarbon (chiefly methane), 0.15 mole of carbon dioxide, and 2.39 moles of acidic material. The acidic material was found to contain lower fatty acids, including acetic and possibly propionic and one of the butyrics or both; lactic acid; γ- or δ-hydroxycaproic acid and the corresponding lactone; and a dihydroxyvaleric acid and the corresponding lactone, with one hydroxyl of the acid in the α-position and the other probably in the δ-position. Under the conditions described cotton cellulose did not undergo hydrogenation at 225°.

The purification of spectrographic carbons, R. Zietlow, P. Hamm, and R. C. Nelson. (Minn. Expt. Sta.). (*Science, 94 (1941), No. 2445, p. 438*).—Medium-grade spectrographic carbons are readily freed of all significant amounts of impurities by 4-hr. treatment in equal parts of concentrated hydrochloric and nitric acids slightly below the boiling point, followed by repeated boiling in redistilled water changed at intervals.

The effect of pH on the lactic acid fermentation, I. C. Gunsalus and C. F. Niven, Jr. (Cornell Univ.). (*Jour. Biol. Chem., 145 (1942), No. 1, pp. 131–136, illus. 2*).—A homofermentative lactic acid organism, *Streptococcus liquefaciens*, was shown to form large quantities of formic and acetic acids and ethyl alcohol in the ratio of 2:1:1 during the fermentation of glucose in a buffered protein-rich medium. The reaction of the fermentation medium was shown to be an important factor in the production of these substances. At or above pH 6.5, the combined yields of formic and acetic acids and ethyl alcohol may account for from 25 to 40 percent of the sugar fermented, the yield of lactic acid falling to 60 percent or less. The formation of a polysaccharide under alkaline conditions of fermentation was observed.

A study of organisms found in lactic acid fermentation of lettuce, L. A. Hohl. (Univ. Calif.). (*Food Res., 7 (1942), No. 4, pp. 309–312*).—Two natural fermentations of shredded and salted lettuce and two fermentations initiated, respectively, by inoculation with *Lactobacillus brevis* and *L. plantarum*, both of which organisms had been isolated from one of the natural fermentations, were examined to determine the nature and count of viable organisms present. "The most prevalent organisms found in lactic acid fermentations of lettuce were *L. plantarum* (Orla-Jensen) Bergey et al., and *L. brevis* (Orla-Jensen) Bergey et al., and some nonsporulating, film-forming yeasts. Occasional cultures of *L. buchneri* (Henneberg) Bergey et al. and *Leuconostoc mesenterioides* (Cienkowski) Van Tieghem were also isolated."

Some chemical changes accompanying tenderization of beef, J. F. McCarthy and C. G. King (*Food Res., 7 (1942), No. 4, pp. 295–299, illus. 4*).—Among the chemical changes found to characterize tenderization of beef by the Tenderay process (approximately 48 hr. at 60° F., relative humidity 85–90 percent, in the presence of ultraviolet lamps), compared with standard low-temperature tenderization (approximately 30 days at 35°), were (1) a more rapid rise in sulfhydryl content indicating a greater rate of protein denaturization, (2) a more rapid increase in soluble nitrogen compounds associated with more extensive hydrolytic changes, (3) a comparable rate of disappearance of ascorbic acid but a higher value at market time, and (4) a more rapid rise in hematin-type pigments in the press juice. The greater retention of ascorbic acid in the Tenderay processed meat is considered of importance in relation to undesirable oxidative changes.

A crystalline protein obtained from a lipoprotein of wheat flour, A. K. Balls, W. S. Hale, and T. H. Harris. (U. S. D. A.). (*Cereal Chem., 19 (1942), No. 2, pp. 279–288, illus. 1*).—A crystalline substance of proteinlike nature was obtained from the petroleum ether extract of wheat flour and was shown to consist mainly of amino acid residues. Arginine, cystine, and tyrosine account for over half of the total nitrogen. The crystals are a hydrochloride of a basic substance. This hydrochloride has a minimum molecular weight of 6,000 and a probable molecular weight of double that value. In the grain and in flour the material exists in the reduced form as a sulfhydryl compound. It is probably a natural activator of the wheat proteinase. The proteinlike substance appears to exist in flour combined with a phosphorus-bearing lipoid as a component of a lipoprotein.

Further observations on a crystalline wheat protein, A. K. Balls, W. S. Hale, and T. H. Harris. (U. S. D. A.). (*Cereal Chem., 19 (1942), No. 6, pp. 840–844*).—This paper presents evidence indicating a peptide nature of linkages between the amino acids that make up most, if not all, of the molecule. This evidence is based on the digestibility of the substance with certain proteolytic enzymes—namely, with crystalline chymotrypsin, chymopapain, and papain, and with crude papain latex. Exhaustive digestion with these proteinases has been found to cause an extensive break-down of the crystalline material, as shown by increases in the amino nitrogen determinable by the Van Slyke apparatus (E. S. R., 26, p. 22). The extent of the degradation varies with the enzyme used and in some cases accounts for half of the increase in amino nitrogen obtained on hydrolysis with acid. The smooth-muscle-contracting property disappears on digestion by papain. The uterus-contracting property of the new substance from wheat is, therefore, referable to a configuration scissile by the enzyme, presumably at one or more peptide linkages. The toxic properties of the material depend on the manner and sequence in which certain components nontoxic in themselves are bound together in the molecule.

With respect to the general mechanism of the action of the proteinase, the authors find that with chymotrypsin the protein behaves as though 1 out of every 6 peptide linkages were split; with the papainases, 3 bonds were split out of 6. Furthermore, on the same basis there appears to be 1 sulfur atom, 1 arginine residue, and 1 free amino group for every 6 bonds; while for every 12 there are 3 chlorine atoms.

The quality of North Dakota durum wheat as affected by blight and other forms of damage in 1940, R. H. Harris and L. D. Sibbitt. (N. Dak. Expt. Sta.). (*Cereal Chem., 19 (1942), No. 3, pp. 403–410, illus. 2*).—Lightly damaged kernels showing discoloration at the tip without apparent injury to the other portions of the kernel can be tolerated in as high a proportion as 10 percent with good milling durum, while 25 percent does not greatly lower macaroni color or increase semolina speckiness. Higher proportions than 50 percent would be extremely hazardous to use in the mill mix. The presence of 5 percent of heavily damaged grain significantly affects the number of semolina specks and macaroni color score, while 10 percent is very detrimental.

It was found that the grade was materially lowered by the presence of heavily damaged kernels, the addition of 50 percent resulting in decreasing the grade from No. 1 Hard Amber Durum to Sample Grade Durum. The presence of 5 percent of heavily injured grain lowered the grade to No. 3 Hard Amber Durum. Light damage was without appreciable effect upon the grade under the existing Federal grading regulations.

Experimental durum milling and processing equipment, with further quality studies on North Dakota durum wheats, R. H. Harris and L. D. Sibbitt. (N. Dak. Expt. Sta.). (*Cereal Chem., 19 (1942), No. 3, pp. 388–402, illus. 9*).—Milling and processing equipment for durum wheat at the station is described in some detail, and the technics employed in the quality evaluation of 32 samples of durum wheat are outlined. The equipment consists of a two-stand Allis-Chalmers experimental mill fitted with suitable rolls; a macaroni processing unit comprising a mixer, kneader, and press, the latter fitted with a device for accurately controlling the press temperature; and a drying cabinet equipped with accessories which enable a time-humidity gradient to be established during the drying period. A description of the flow sheet used in durum milling is included, as well as a time-humidity gradient chart showing the various relative humidities obtained during the drying period.

Thirty-two samples of durum wheat grown at Langdon and Fargo in 1939 and 1940 were milled and processed by the equipment and methods described.

Factors which influence the physical properties of dough, III, IV. (Kans. Expt. Sta.). (*Cereal Chem., 18 (1941), No. 5, pp. 615–627, illus. 5; 19 (1942), No. 1, pp. 102–120, illus. 6*).—The two papers here noted extend to other factors the general method of investigation already applied to the effects of autolysis and of enzymes (E. S. R., 86, p. 150).

III. *Effect of protein content and absorption on the pattern of curves made on the recording dough mixer*, C. O. Swanson.—The main characteristics of the curves obtained on the recording dough mixer with flours from sound wheats are determined by variety. Within any variety a 2-percent variation in absorption will notably affect the height of the curve, but the main pattern due to varietal characteristics is not affected. The protein content is the most potent factor within a variety. Given a reasonably correct absorption the height of the curve will be greater with increasing protein content. The distinctive varietal characteristics are more pronounced in the curves from medium- and high-protein flours than from low-protein flours. When high-protein flours are diluted with starch or a very low-protein flour so that the protein contents of the blends are equal, the patterns of the curves from the blends will be the same within a given variety, but the curves of the blends of one variety will be different from those of another variety, provided, of course, that the original flours from these varieties gave different curve patterns. Theories explaining why variations in absorptions and protein contents influence the patterns of the curves are propounded.

IV. *The effects of surface active agents on the characteristics of the curves made by the recording dough mixer*, C. O. Swanson and A. C. Andrews.—Surface-active or interfacial-tension-reducing agents were found to modify the characteristics of the curves made by the recording dough mixer to such an extent that the patterns associated with such varieties as Chiefkan may be made similar to the patterns of Turkey or Tenmarq. The most notable effects were to increase the time of development, increase the angles of the up-and-down slopes, and decrease the rate of break-down of the dough. The smooth narrow characteristic of the last part of Chiefkan curves was completely obliterated. The surface-active agents reduced the surface tension of water about one-half or more. The effects on the doughs cannot be explained solely by decreases in the surface tension. The effects of the agents were greater as the concentration of the agent increased. The surface-tension reduction of water proceeds to a certain point, after which further additions of the agent produce no further decrease. Some agents had very little effect on the curve patterns, but reduced the surface tension of water to about the same extent as those which had marked effects.

The authors believe that the effects of these agents on the curve patterns may be due to their ability to alter the configuration or form of the protein molecule. Theoretical considerations supporting this opinion are briefly discussed.

The testing of wheat quality by recording dough mixer curves obtained from sifted wheat meals, J. A. JOHNSON, JR., and C. O. SWANSON. (Kans. Expt. Sta.). (*Cereal Chem., 19 (1942), No. 2, pp. 216–229, illus. 4*).—The authors describe a method which makes it possible to obtain satisfactory curves on the recording dough mixer, using sifted wheat meals instead of flours. The curves obtained from the meals are not exactly like those obtained from the flours, but they are closely correlated in the characteristics of height, time of development, and the angles made by the up and down slopes of the curves. These correlations are statistically significant. The dough-mixer curve characteristics of a wheat may, therefore, be observed almost as well from the meal curve as from the flour curve.

Quantity of dough in relation to the use of the farinograph, O. E. STAMBERG and P. P. MERRITT. (Minn. Expt. Sta.). (*Cereal Chem., 18 (1941), No. 5, pp. 627–632, illus. 2*).—Plasticity of the dough as recorded by the farinograph was found to be an almost linear function of its weight when the ratio of ingredients is kept constant. It increased very nearly one farinograph unit per gram of increase in the weight of dough. Constant quantity of dough was shown to be essential in the accurate use of the farinograph. Optimum charge of ingredients appeared to be 480 gm. in the large bowl and 80 gm. in the small bowl. Curves made on the same flour with a constant ratio of ingredients at three weight levels with both bowls were not identical when comparable precise measurements were made of them. Covers for the bowls are recommended to prevent loss of moisture from the doughs during a test.

***A study of the net weight changes and moisture content of wheat flour at various relative humidities*, C. A. ANKER, W. F. GEDDES, and C. H. BAILEY.** (Minn. Expt. Sta.). (*Cereal Chem., 19 (1942), No. 1, pp. 128–150, illus. 2*).—The rate of change in the weight of flour containing from 13.3 to 13.4 percent moisture when packed in 5-, 10-, and 24.5-lb. paper and cotton bags when stored in air-conditioned cabinets maintained at 70°–71° F. and relative humidities of 36, 45, 59, and 72 percent, respectively, was relatively rapid during the first several days of storage. The rate of change decreased with increasing package size and was greater for cotton than for paper sacks. The cumulative percentage changes in weight for the various containers stored at any one humidity tended to equalize and approach a common value, however. Rate of moisture loss on exposure to low relative humidity was much more rapid than the rate of regain. The partial drying of flours even at atmospheric temperatures apparently permanently reduced their hydration capacity.

The approximate moisture equilibria obtained in the storage trials at 70°–71° for 36, 45, 59, and 72 percent r. h. were 9.8, 11.3, 13.2, and 14.4 percent moisture, respectively, as determined by the 130°-C. air-oven method. Laboratory studies of the hygroscopic equilbria of the same flour brought to initial moistures of 6.5, 12.2, and 14.7 percent conducted at 25° over the range of from 10 to 80 percent r. h. revealed that the equilibrium is influenced either by the initial moisture content of the flour or by the environmental conditions to which the flours were exposed during conditioning. An S-shaped curve best expressed the relation between relative humidity and hygroscopicity, and is in accord with theoretical considerations of the water relationships of colloids. A given flour does not possess a definite hygroscopicity, the hydrophilic properties being influenced by its past history.

Some studies on flour absorption, P. P. Merritt and O. E. Stamberg. (Minn. Expt. Sta.). (*Cereal Chem.*, *18* (*1941*), *No. 5*, *pp. 632–639*, *illus. 4*).—Absorptions of 12 flours, ranging from 7.26 to 15.50 percent protein content, necessary to have a constant plasticity in the farinograph and a constant flow in the pressure plastometer, were found to increase about 1.5 percent for each 1 percent increase of protein content. Baking tests were carried out using the flours at various absorption levels, and at each level loaves were baked first with a constant amount of dough of 150 gm. and, secondly, from all of the dough resulting from 85 gm. of flour, dry basis. With the first method, peaks of optimum absorption were observed as judged from the bread quality, but with the second method no peaks were noticed over the absorption range studied. Optimum absorptions resulting from the baking tests with a constant quantity of dough gave doughs of low plasticity in the farinograph for low-protein flours and increasingly higher plasticities for higher-protein flours. The possibility of using a constant absorption and a constant quantity of dough in test baking for flour quality is suggested.

Hysteresis of air-dry wheat starch, H. C. Reitz, R. A. Gortner, and R. E. Carlson. (Minn. Expt. Sta.). (*Cereal Chem.*, *19* (*1942*), *No. 3*, *pp. 423–424*, *illus. 1*).—Air-dry wheat starch undergoes hysteresis with time, as evidenced by cold gelatinization viscosity behavior. An air-dry wheat starch cannot be used over a period of years as a viscometric standard.

Effectiveness of dry milk solids in preventing overbromation of some bleached hard winter wheat flours, G. A. West and E. G. Bayfield. (Kans. State Col.). (*Cereal Chem.*, *19* (*1942*), *No. 4*, *pp. 481–492*, *illus. 2*).—Chiefkan showed little improvement from the addition of dry milk solids and proved inferior to the other three varieties in baking quality. Nebred flour before and after bleaching proved to be very sensitive to added potassium bromate. Nebred benefited more than the other varieties from the addition of dry milk solids, although when bleached it gained little tolerance to bromation when milk was added. The presence of 6 percent of dry milk solids in doughs reduced the possibility of damage from excessive amounts of bromate used in baking unbleached or bleached samples of flour. The inclusion of dry milk solids increased the loaf volume and improved the crust and crumb color, grain, and texture.

The effect of heat treatment of milk in relation to baking quality as shown by polarograph and farinograph studies, O. E. Stamberg and C. H. Bailey. (Minn. Expt. Sta.). (*Cereal Chem.*, *19* (*1942*), *No. 4*, *pp. 507–517*, *illus. 4*).—Fresh unheated separated milks, subjected to polarographic analyses, gave current-voltage curves analogous to those obtained with cysteine-cystine solutions. When the samples were heated for 5 min. at 97°–100° C. the polarograms no longer had this characteristic. Quantitative estimations of the sulfhydryl groups in the raw-milk samples showed them to be present in amounts sufficient to cause a pronounced dough-softening action as compared to the action of cysteine hydrochloride. Farinograms showed that the dough-softening factor in unheated fresh milk was present in the whey portion, and probably in the lactalbumin.

To explain the effect of heat treatment of raw milk in eliminating the dough-softening action, it is postulated that low-molecular-weight lactalbumin molecules with exposed sulfhydryl groups combine during the heat treatment to give protein aggregates of higher molecular weights. During this process the sulfhydryl groups are either oxidized to the more stable disulfide linkage, or masked by occlusion.

Chemical factors affecting the baking quality of dry milk solids, I, II. (Wash. Expt. Sta.). (*Cereal Chem., 19 (1942), Nos. 1, pp. 94–101, illus. 3; 6, pp. 830–837*).—Two papers are presented.

I. *Correlation of pH and baking score*, U. S. Ashworth, N. S. Golding, G. H. Farrah, and D. D. Miller.—An examination of 3,170 samples of dry milk solids for pH and baking score showed no significant effect of the pH on dry milk solids on the baking quality of the doughs made from them. Dry milk solids with poor baking quality were produced in the main during the latter part of July and through August for both years studied. The pH at this time of the year was above average.

II. *The effect of milk on gluten fractionation*, U. S. Ashworth and H. A. Harland.—The results of two methods for gluten fractionation show that milk itself breaks down gluten but does not activate the break-down by papain. The second result of one of these methods indicated that milk has an inhibitory effect on the action of papain, and effect which is confirmed by baking results. Milk prevents the activation of papain by yeast.

The influence of temperature on the development of amylase in germinating wheat, E. Kneen, B. S. Miller, and R. M. Sandstedt. (Nebr. Expt. Sta.). (*Cereal Chem., 19 (1942), No. 1, pp. 11–27, illus. 5*).—Changes taking place at the different temperatures were quite similar, differing essentially only in rapidity. At the germination temperatures of 20°, 15°, 10°, and 5° C. approximately 4, 6, 10, and 24 days, respectively, were required to produce equal sprout lengths and amylase activity. Both free and total saccharogenic activity (per gram of dry sample) increased progressively throughout germination, the free extract becoming equal in activity to the total after seedling sprout length approximated from 30 to 35 mm. Total β-amylase activity showed a slight increase during the first stages of growth, followed by an effective decrease.

The effect of temperature change during malting on four barley varieties, H. L. Shands and A. D. and J. G. Dickson. (Wis. Expt. Sta. and U. S. D. A.). (*Cereal Chem., 19 (1942), No. 4, pp. 471–480, illus. 1*).—Oderbrucker, Wisconsin Barbless, Peatland, and Chevron barleys of the 1939 crop were malted for 6 days and at 12°, 16°, and 20° C. constantly and in different sequences. The respective steeping times were 41, 43, 33, and 33 hr., and the moisture content of the green malt averaged slightly above 44 percent. Malting methods giving low steep and respiration losses gave high values for recovery, extract, and formol N. Recovery percentages also closely paralleled those of extract and formol N and less closely those of wort N. High extract was associated with high formol N ratios and to a lesser extent with a high wort N ratio. There was a suggestion that high extract values and prolonged conversion times were related to low wort colors. More diastatic power usually accompanied higher wort and formol N ratios and shorter conversion time. Wort and formol N ratios responded somewhat similarly to different malting conditions.

Factors influencing the texture of peas preserved by freezing, M. M. Boggs, H. Campbell, and C. D. Schwartze. (Wash. Expt. Sta. coop. U. S. D. A. and West. Wash. Sta.). (*Food Res., 7 (1942), No. 4, pp. 272–287*).—Variations in the texture of frozen peas and factors affecting this texture were studied. The methods employed for determining the texture were applied to the frozen peas after cooking and involved determination of the resistance of the skins to penetration and of the cotyledons to crushing. Fresh peas of different sieve sizes showed less variation in texture than did peas of one sieve size taken from pods which appeared to be of different maturity, even when the variety, field, and day of harvest were the same. Sieve sizing, therefore, was considered an unsatisfactory means of separating peas of a run-of-the-field sample into texture groups. The longer peas were left in the field the greater was the penetration resistance of any given size of cooked frozen peas. This indicated the undesirability of harvesting at a later date and discarding the large sizes of peas. Penetration values of peas harvested on different dates were related to the tenderometer readings. Increasing the boiling time from 5 to 15 min. did not lessen the toughness of tough skins. Vining, in contrast to hand picking, toughened both the skins and cotyledons of frozen peas. Delay between vining (or hand picking) and freezing toughened the skins but not the cotyledons of frozen peas. Most of the toughening of the vined peas occurred in the first 4–6 hr. of delay, with little or no additional toughening between the sixth and the ninth hour. Washing of the vined peas to remove the vine juice before delay periods did not prevent toughening of the skins, although less toughening resulted than when the peas were held without washing. Cooling the peas to 35° F. during delay periods lessened but did not prevent toughening of the skins within 3 hr. Delay of 6 hr. at 35°, 3 or 6 hr. at 75°, or 3, 6, or 9 hr. at 100° toughened the skins of frozen peas as much as an increase in maturity reflected by an increase from 102 to 118 in tenderometer reading.

Potato by-products (*Maine Sta. Bul. 411–C (1942), pp. 313–316*).—C. A. Brautlecht found the average starch content in samples for the season to be 11.5 percent, the maximum starch content 15.8, and the minimum (in rotted culls) 5.0 percent. Starch analyses made with a view to the ultimate establishment of product quality standards are also reported upon, together with analyses of drained pulps which indicated as the average composition about 1.0 percent mineral matter, 86 percent water, about 0.16 percent nitrogen (or 1.0 percent protein), 2.0 percent crude fiber, 9 percent nitrogen-free extract (noncellulose carbohydrate), and about 0.3 percent crude fat. The pH of the water extract was about 6.2. Also discussed are starch potato supply, starch market and price, and pulp investigations, the last named study leading to the conclusion that the waste potato pulp, upwards of 10,000 tons on a dry basis, should not go into streams but should be used as a cattle feed, or, at least, go back to the land.

Processing watermelon rinds for food, J. G. Woodroof and S. R. Cecil. (Ga. Expt. Sta.). (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1942), No. 3, pp. 73–74*).—Preparation of the rinds as the first step in processing involves (1) hand peeling with a knife, (2) planing with a simple machine, or (3) peeling by 10 percent lye with 0.5 percent wetting agent heated to 145° F. for from 5 to 7 min. Preservation of the peeled rind may be accomplished by packing in brine for about 2 weeks, preferably with the addition of SO_2 to the final brine (to a concentration of 2,000 p. p. m.), or by direct packing in an SO_2 solution (2,000 p. p. m.) plus 0.02 percent Ca as $CaCO_3$. Rinds packed in brine are satisfactory for making preserves, but are a bit soft for bakery products; SO_2 in the final brine improves the texture deficiency. The best rinds from the standpoint of appearance and texture are obtained by the SO_2 preservation, with the Ca for firming. Since SO_2 has very little permanent bleaching effect on the green color, care must be used to remove all of this before the product is packed. The third step in processing, conversion of prepared rinds into edible food, consists in removal of the preservative solution by soaking the brined rinds in water for 12 hr., followed by cooking in fresh water for 1 hr., or by cooking the SO_2-preserved rinds for from 1½ to 2 hr. on an open stove or about one-third this time in a jacketed kettle, with frequent replacements of water boiled away. After removal of the preservative, the rinds are preserved in a sugar sirup with the addition of sliced lemon.

AGRICULTURAL METEOROLOGY

The United States Weather Bureau and its service for the muck farmer, H. M. WILLS (*Mich. Muck Farmers Assoc., 24 (1942), pp. 25–29*).

Forecasting run-off from snow surveys, R. C. FARROW (*Geog. Jour., 100 (1942), No. 5–6, pp. 206–222, illus. 10*).—This is an address presenting a general discussion of the subject, with particular reference to British Columbia and Washington State and applications to agriculture and industry.

Climatological data for the United States by sections [1941] (*U. S. Dept. Com., Weather Bur. Climat. Data, 28 (1941), No. 13, pp. [275], illus. 31*).—Summaries are given of climatological data for each month of 1941 and for the year as a whole for each State.

Monthly Weather Review [November–December 1942] (*Mo. Weather Rev. [U. S.], 70 (1942), Nos. 11, pp. 249–266, illus. 11; 12, pp 267–287, illus. 12*).—In addition to meteorological, climatological, solar radiation, and sunspot data, these numbers contain the following contributions: No. 11, The Classification of Climates, by A. C. Arias (pp. 249–258); and No. 12, Reliability of the Forest Service Type Rain-Gage, by G. L. Hayes (pp. 267–268), Preliminary Report on Tornadoes in the United States During 1942, by J. L. Baldwin (pp. 268–270), and The Weather of 1942 in the United States, by J. L. Baldwin (pp. 271–274).

Kansas weather and climate, A. B. CARDWELL and S. D. FLORA (*Kansas Sta. Bul. 302 (1942), pp. 108, illus. 13*).—Located in the geographical center of the United States, Kansas has a climate generally typical of the Great Plains region Removed from the immediate influence of extensive water areas, its air is dry, the temperature ranges are large, and its sunshine is abundant. Unobstructed by mountains, its winds flow freely, and its location favors it with a normal sufficiency of precipitation and provides the variety of its wide seasonal ranges in snow and rainfall. Though drier than the Eastern States, its normal rainfall in every section is said to be fully sufficient for staple crops. The State has three rather distinct climates—eastern, middle, and western. For the State as a whole, discussion is given of precipitation, temperature, frosts, droughts, floods, winds, tornadoes, hail, and sunshine and cloudiness; and tabulations are presented both for the three regions and for the State as a whole relative to such climatic data as annual mean temperature and by months and years (1887 or 1888 to 1940), average annual and total annual precipitation and by months and years for the same periods, relative humidity by months and years, average date of the first and last killing frosts, average length of the growing season, number of days with temperature reaching 95° F. or more and 100° or more, and snowfall by months and years.

SOILS—FERTILIZERS

Soils manual for the Seventh Farm Credit District, with crop requirements supplement, G. W. PATTESON (*U. S. Dept. Agr., Farm Credit Admin., 1942, pp. 371+, illus. 7*).—A manual designed to assist land appraisers in understanding such physical factors as the soil, the climate, and the crop in determining land values.

Classifying land for conservation farming, R. D. HOCKENSMITH and J. G. STEELE (*U. S. Dept. Agr., Farmers' Bul. 1853 (1943), pp. [48], illus. 42*).—An illustrated presentation describing in detail farming and conservation practices recommended, according to use capability of the land, so as to accomplish maximum production without wasting labor or exposing the land to harmful erosion.

Soils in a virgin hemlock-beech forest on the northern Allegheny Plateau, A. F. HOUGH. (U. S. D. A. coop. Pa. State Col. et al.). (*Soil Sci., 54 (1942), No. 5, pp. 335–341, illus. 1*).—Observations both of soil type profile characteristics and of the species composition, abundance, and frequency of occurrence of trees in a virgin hemlock-beech forest in northwestern Pennsylvania are recorded.

The three major soil types differed in profile characteristics as a result of past geological, physiographic, and pedological history, especially drainage conditions. Statistical comparisons of plats on each soil type, using basal area as an indication of productive capacity or stocking in this uneven-aged virgin forest, showed no major differences in the average basal area or percentage species composition between any two of these three major soil types. This is explained on the basis (1) of the adaptability of the native old-growth tree species to a rather wide variety of different sites; (2) of the generally heavy texture of the Allegheny Plateau soils and abundant well-distributed precipitation, which tends to reduce the importance of soil factors as limiting to virgin tree growth; and (3) of the action of powerful climatic and biotic factors, fully as important in guiding the development of the virgin forest as is the influence of existing soil type differences.

Soil properties of tilled orchards compared with untilled areas, R. E. Stephenson and C. E. Schuster. (Oreg. Expt. Sta. and U. S. D. A.). (*Soil Sci., 54 (1942), No. 5, pp. 325–334*).—Of chemical changes brought about by cultivation, the authors note that some cultivated orchard soils in western Oregon contain from one-fifth to two-fifths less organic matter, as indicated by the method of Walkley and Black (E. S R, 70, p. 742), than do similar uncultivated soils. They also found that availability of phosphorus, as estimated by Truog's method (E. S. R., 64, p. 312), may be reduced as a result of long-continued cultivation, partly through nutrient and organic matter depletion and the unfavorable biotic changes that have taken place.

With reference to physical changes, their observations indicated that an appreciable change in soil structure is associated with tillage and organic matter depletion; that tillage pans interfering with water penetration and with proper functioning of the soil are common in cultivated orchards; and that the immediate soil surface may become dispersed and run together until water cannot penetrate. Many soils are more spongy and porous a few inches below the depth disturbed by tillage than in any other part of the profile. This layer is full of large, easily visible cavities, probably the result of undisturbed insect and other animal life in the soil.

Influence of soil type and temperature on rate of escape of chloropicrin, J. D. Wilson (*Ohio Sta. Bimo. Bul. 220 (1943), pp. 38–41*).—The practical considerations involved in the use of chloropicrin as a soil disinfectant are discussed. Experimental results revealed that the escape of chloropicrin is more rapid from light-textured soils that warm up quickly than from heavy-textured, cold soils. In order to avoid injury in the setting of plants in soils at 90° F. a period of 9 days should elapse between treatment and setting. Organic soils were found to retain chloropicrin for longer periods than mineral soils.

The occurrence and origin of ureaselike activities in soils, J. P. Conrad. (Calif. Expt. Sta.). (*Soil Sci., 54 (1942), No. 5, pp. 367–380, illus. 7*).—The author determined the reduction in concentration of standard urea solutions percolated through portions (usually 400 gm.) of soil under constant temperature conditions and in the presence of toluene. Successive equal increments of the urea solutions were added to each percolator under test at equal (usually 12- or 24-hr.) intervals. The successive percolates collected separately were analyzed for urea. After the rather small adsorptive capacity of the soil for urea was satisfied, generally from the first and second increments of solution added, the reduction in the original concentration of urea was taken as a criterion of the catalytic activity of the soil.

Considerable variations both in adsorptive capacity and in catalytic activity were observed. The activity was usually higher in the upper foot than in soil layers from lower levels, in soils with more organic matter, and by soil with plant covers such as sods, pastures, and cover-cropped and weedy areas, than in soils not supporting as much plant growth, and, in a soil preheated to destroy any ureaselike activity, in that part of the soil in which some crop plants were grown than in that not cropped. Plant residues, including jackbean urease, pine needles, coarse alfalfa hay, oat straw, barnyard manures, and leaf composts, when added to soil increased its activity in various degrees. The ureaselike activities were much increased in many cases by the 2-mo. incubation of respective lots of preheated Yolo silt loam to which had been added various materials, such as oat straw, sucrose, starch, urea, nitrate, gelatin—substances themselves lacking or low in ureaselike activities. Presumably the ureaselike activities originated from the increased growth of micro-organisms during the incubation period.

Limitations of auto-irrigators for controlling soil moisture under growing plants, L. A. Richards and W. E. Loomis. (Iowa Expt. Sta.). (*Plant Physiol., 17 (1942), No. 2, pp. 223–235, illus. 5*).—With low barostat tensions good moisture control was attained while the plants were small, and there was no change in the average pot weight from day to day. With larger plants, however, when the daily transpiration loss was greater than about 100 cc. per day (350 cc. per day for the 10-in. pots), it was not possible to maintain the soil moisture content, even with the supply water for the reservoir at tensions as low as from 2 to 4 cm. of mercury. Satisfactory growth can be obtained and the rate at which the plants absorb water varied, but soil moisture under crop plants having high respiration rates and rapidly developing root systems cannot be maintained at any reasonably constant value except near saturation. The limitation in the range of successful operation of irrigators may be ascribed primarily to the slow rate at which drying soils absorb and transmit water, particularly when the soil moisture is under appreciable tension.

Plant analysis as a diagnostic procedure, A. Ulrich. (Univ. Calif.). (*Soil Sci., 55 (1943), No. 1, pp. 101–112, illus. 3*).—The author finds that at any one time a chemical analysis of the plant or part of the plant gives an integrated value of all the factors that have influenced its nutrient composition. By comparing the nutrient changes taking place during the development of the crop with previously established critical levels, the nutrient status of the plant may be ascertained. Plants with nutrient concentrations above the critical values may be considered adequately supplied at that moment, whereas plants with values within the critical range may be considered inadequately supplied. The longer a deficiency persists, and the earlier during the growth cycle it occurs, the greater is the likelihood of a response upon the application of the deficient nutrient. The supplying power of the soil for a nutrient is one of many factors (soil, climate, plant, time, management, and possibly others) affecting the concentration of nutrients in the plant, a fact which accounts for the frequent failure of soil analysis to serve as a satisfactory guide for fertilizer practices.

The practical application of plant analysis as a diagnostic procedure rests essentially upon the reliability of the critical nutrient levels. The limited variations found in the critical potassium concentrations of appropriate plant tissues give hope that useful interpretations may be made.

Plant-tissue testing in diagnosis of the nutritional status of growing plants, G. D. Scarseth. (Ind. Expt. Sta.). (*Soil Sci., 55 (1943), No. 1, pp. 113–120*).—The Purdue plant-tissue testing method, described by Thornton et al. (E. S. R., 72, p. 303), is considered of value in determining the fertilizer needs of crops in that it indicates the presence or absence of these nutrients in the conducting tissues of the plant in soluble, unassimilated form. Results of tests made on crops in long-term fertility tests to show the relation between the findings of the tests and the actual yield of the crop are described and discussed in terms of the diagnostic value of the tests.

Some chemical properties of soil organic matter and of sesquioxides associated with aggregation in soils, T. A. Weldon and J. C. Hide. (Kans. Expt. Sta.). (*Soil Sci., 54 (1942), No. 5, pp. 343–352*).—Proximate chemical analyses of the organic matter and related data for a well-aggregated and a poorly aggregated fraction of four "slick spots" and four differently treated plats of a fertility series are reported upon.

Cultivation and various soil treatments changed the chemical composition of the organic matter of some of the fractions. The carbon and nitrogen content was distinctly higher in the well-aggregated than in the poorly aggregated fractions. Organic carbon was determined by Allison's modification (E. S. R., 74, p. 445) of Schollenberger's method. The alcohol-soluble portion of the organic matter was relatively low in all the well-aagregated fractions. The ether-soluble material was also low in the well-aggregated fraction of the slick spots, but in the fertility plats this relation was reversed. Some soil treatments increased the lignin content of the organic matter of both of the differently aggregated fractions of the soil fertility samples, but the protein content was decreased. In general, the nitrogenous material in the poorly aggregated fraction was more completely extracted by hydrolysis with weak HCl than was that in the well-aggregated fraction. This was not true for the H_2SO_4 treatment. Both acid hydrolyzates of the poorly aggregated fractions usually contained a relatively high proportion of their nitrogen in the amide form. Larger quantities of sesquioxides were removed by the acid extractions from the well-aggregated fraction than from the poorly aggregated fractions. In the slick spots this difference averaged more than three to one.

Nitrogen, phosphorus, and potassium interrelationships in young peach and apple trees, F. P. Cullinan and L. P. Batjer. (U. S. D. A.). (*Soil Sci., 55 (1943), No. 1, pp. 49–60, illus. 1*).—Inadequate nitrogen supply in the nutrient solution affects vegetative growth markedly. When nitrogen is inadequate, the effects of low phosphorus or low potassium on growth are not so marked, but at a high-nitrogen level growth-deficiency symptoms appear when either phosphorus or potassium is present in low concentration. The deficiency symptoms are more marked in peach than in apple trees. Potassium-deficiency symptoms on peach are also more noticeable at a high calcium : potassium ratio. Leaf analyses show that the content of nitrogen, phosphorus, and potassium in the leaves is related to the supply in the nutrient in sand culture even when fairly wide ratios of concentrations have been maintained. Under field conditions, where the available supply of potassium in the soil is low, deficiency symptoms are usually accentuated by adequate nitrogen applications. Phosphorus deficiency has not been found to any appreciable extent under field conditions. Both peach and apple trees seem to obtain from the soil enough to maintain satisfactory growth.

It is believed that the results obtained with leaf analyses justify their further use with fruit trees as an index of the adequacy of available nutrients in the soil and as an aid in diagnosing abnormal growth responses that may be caused by mineral deficiencies.

Potassium absorption by plants as affected by cationic relationships, W. H. Pierre and C. A. Bower. (Iowa Expt. Sta.). (*Soil Sci., 55 (1943), No. 1, pp. 23–36, illus. 1*).—Some of the more important general conclusions concerning the effect of other cations on potassium absorption from solution are as follows:

Potassium absorption by plants is usually decreased by the presence of high concentration of other cations in solution but may be increased. The decreased absorption of potassium may have a detrimental effect, a beneficial effect, or no effect on yield, depending on the quantity absorbed in relation to the needs of the plant. The decrease in potassium absorption resulting from high concentrations of other cations is not so pronounced as is the effect of potassium on the absorption of calcium or magnesium. The effect of various cations on the absorption of potassium by plants depends on a number of factors, many of which are additive. Among these, the plant species and the ratio of other cations to potassium are probably dominant. The high ratio of calcium and magnesium to potassium in the soil solution of the high-lime soils of Iowa may be an important factor contributing to the low availability of the potassium to corn and other crops in these soils. The high nitrate content and high pH value of these soils probably increase the depressive effect of calcium and magnesium on potassium absorption.

Potassium in the soil colloid complex and plant nutrition, W. A. Albrecht. (Mo. Expt. Sta.). (*Soil Sci. 55 (1943), No. 1, pp. 13–21*).—The author presents a résumé of the known behavior of the potassium ion in soils and plants, drawing the conclusion, among others, that the ratio of potassium, in the colloid crystal and in the adsorbed form, to other adsorbed plant nutrients, as well as the total quantity of this element, is related to the degree of soil development; and that the calcium : potassium ratio has an important ecological influence. It is also pointed out that apparently potassium is almost uninfluenced by the H ion that mobilizes other cations into plants. Its adsorbed form becomes "fixed" to a significant extent even during short periods of plant growth.

Practical applications of potassium interrelationships in soils and plants, L. D. Baver. (N. C. Expt. Sta.). (*Soil Sci., 55 (1943), No. 1, pp. 121–126*).—Using field plat data from the Missouri Experiment Station, together with some data from pot experiments on potassium loss from a Creedmoor coarse sandy loam, the author offers a general discussion of potassium fertilizer requirement problems and reaches the conclusion that "plant-potassium and soil-potassium interrelationships have concrete practical application to the problems of agriculture. For most efficient crop production, technical knowledge must be tied in with a thorough understanding of the crop, the soil, the farming system, and the method of fertilizing."

Potash fixation in Corn Belt soils, E. E. DeTurk, L. K. Wood, and R. H. Bray. (Ill. Expt. Sta.). (*Soil Sci., 55 (1943), No. 1, pp. 1–12, illus. 4*).—Potassium fixation, which is found to be well-nigh universal in the soils of the Corn Belt when soluble potassium salts are added, occurs gradually under moist storage conditions, reaching equilibrium in about 6 mo. Evidence submitted supports the theory that fixed potassium is in equilibrium with that in the replaceable status. Significant release to the replaceable form has been attained within 30 days under conditions of nonequilibrium favorable to release (removal of replaceable K). The quantities so released in 330 days were greater in soils that had been allowed to fix K from additions than in untreated soils. The quantity of potassium fixed after uniform additions was found to vary with different soils, but no precise correlation has been established between the amount of the fixation and any other soil characteristic. No maximum limit of fixation capacity has been demonstrated, even by additions up to 10,000 p. p. m., equivalent to 20 tons of KCl an acre. Addition of potassium as the phosphate resulted in greater K fixation than addition of equivalent chloride and also resulted in a higher ratio of replaceable to water-soluble K. The latter phenomenon is explained as probably due to PO_4 serving as a link between K ion and colloid particle by replacing one or two OH ions in the latter for each PO_4 ion absorbed. Significant quantities of K were found to be fixed by extracted soil colloids of three different particle size grades, all less than 1μ in effective diameter. Some of the potassium thus fixed was not extracted by boiling in 5 N HNO_3.

The effect of lime and magnesia on the soil potassium and on the absorption of potassium by plants, M. Peech and R. Bradfield. (Cornell Univ.). (*Soil Sci., 55 (1943), No. 1, pp. 37–48, illus. 2*).—A critical review shows that the apparent confusion concerning the effect of lime and magnesia on the soil potassium and on the absorption of potassium by plants arises largely from a "failure to evaluate properly the experimental conditions under which the results were obtained and to distinguish the calcium-potassium interactions in the soil from those in the plant." The addition of lime to soils containing neutral salts (of strong acids) may have no effect, may decrease, or may increase the concentration of potassium in soil solution, the result depending upon the initial degree of base saturation of the soil. In the absence of neutral salts, the addition of lime will invariably liberate the adsorbed potassium even when a quantity insufficient to neutralize all of the exchangeable hydrogen is added. Experimental facts regarding the influence of lime on the uptake of potassium by plants are held readily interpretable in the light of these effects of lime on the soil potassium, particularly on the calcium : potassium ratio of the soil solution.

Calcium-potassium ratios for alfalfa, A. S. Hunter, S. J. Toth, and F. E. Bear. (N. J. Expt. Stas.). (*Soil Sci., 55 (1943), No. 1, pp. 61–72, illus. 1*).—On a series of prepared soils having calcium and potassium in the exchange complex in initial ratios varying between 1:1 and 32:1, and constant percentages of other major and minor elements, in general an abrupt drop in yield occurred when the calcium content of the plant tissue became greater than 2 percent, when the potassium content fell below 1 percent, or when the calcium: potassium ratio exceeded 4:1. These are considered to have been critical limits in this experiment.

It was concluded that alfalfa can adjust itself to wide variations in soil calcium : potassium ratios, making normal growth at ratios anywhere between 1:1 and 100:1, but the highest total yield and the best root development were produced in soil having a calcium : potassium ratio of 1:1 at the start of the test. "The soil having a 4:1 ratio, however, might well be considered more nearly optimum for the period of this experiment, which was designed to have an effect on the soil equivalent to that of 10 years' cropping." On that soil the calcium : potassium ratio in the test plants was approximately 1:1 for the first crop and a little over 3.5:1 (well under the estimated critical 4:1 ratio) for the seventh; the content of calcium in the plants never exceeded the estimated critical maximum of 2 percent; and the amount of potassium in the plants dropped only slightly below the estimated critical minimum of 1 percent in the seventh crop. The plants on the 4:1 soil had good root development and showed evidence of recent growth after the seventh crop had been harvested. Although there was some luxury consumption of potassium by the plants growing on the 4:1 soil, the average percentage potassium in the harvested crops was only 2.14, which was well below the maximum 3.54 percent.

Zinc deficiency of pineapples in relation to soil and plant composition, O. Lyman and L. A. Dean. (Hawaii Expt. Sta.). (*Soil Sci., 54 (1942), No. 5, pp. 315–324, illus. 3*).—The essential features of the method described are a wet combustion followed by the removal of phosphate by absorption with metatitanic acid, and a polarographic determination of the zinc. A similar procedure for determining the soluble zinc in soils is proposed. A relationship between the degree of zinc deficiency exhibited by pineapple plants and the soil zinc soluble in ammonium acetate at pH 4.6 apparently was found. The meristematic tissues contained the greatest concentrations of zinc. The growing points of zinc-deficient pineapple plants were found to contain less zinc than normal or slightly zinc-deficient plants, and their zinc content was related to the degree of zinc deficiency in the plant as a whole.

Nitrogen conservation of night soil in central China.—I, Change in night soil, feces, and urine on storage, H. L. RICHARDSON and Y. WANG (*Soil Sci., 54 (1942), No. 5, pp. 381–389, illus. 3*).—Changes in percentage nitrogen content in the stored materials, held under conditions similar to those on farms, were relatively small, although they amounted to more than half of the urine nitrogen. Ammonia nitrogen increased rather rapidly in the feces, less rapidly in the night soil, and decreased steadily in the urine. Over the whole period of storage (16 weeks) the losses in dry weight were 28, 17, and 11 percent for the feces, urine, and night soil, respectively. The nitrogen losses were 0.491, 0.124, and 0.168 gm., respectively, per 100 gm. of original material. The "percentage conservation" of total nitrogen was 76 for night soil, 63 for feces, and 39 for urine.

[Use of fertilizers in Mississippi] (*Miss. Farm Res. [Mississippi Sta.], 6 (1943), No. 2, pp. 1, 7, 8*).—These pages include the following articles: Fertilizer Recommendations for 1943, by C. Dorman (pp. 1, 8), and Cottonseed Meal Too Expensive for Use as Fertilizer (p. 1) and The Fertilizer Situation (pp. 1, 7), both by W. B. Andrews.

Suggestions for the use of the war grades of fertilizer, G. S. FRAPS (*Texas Sta. Cir. 100 (1942), pp. 8*).—A timely presentation of suggestions on fertilizers for field crops, vegetables and fruits, and for lawns, flowers, etc., based on modifications necessary because of wartime demands for chemical nitrogen.

Analyses of commercial fertilizers, manures, and agricultural lime, 1940 [and 1941], C. S. CATHCART (*New Jersey Stas. Insp. Ser. 2 (1941), pp. 35; 5 (1941), pp. 32*).—Data are given on the inspection of these materials as sold in New Jersey during 1940 and 1941, respectively.

AGRICULTURAL BOTANY

[Abstracts of papers prepared for presentation before the Botanical Society of America] (*Amer. Jour. Bot., 29 (1942), No. 10, pp. 1s–21s*).—Among the 107 abstracts included are those of various papers of special interest to agricultural botany, e. g., on plant genetics, vitamins and growth substances in plants, tea substitutes, diurnal changes in forage crops, chlorophyll and photosynthesis, wood characters of white pines, the sponge gourd (*Luffa*), and the Russian dandelion.

Bacterial generic names as common nouns, R. S. BREED and H. J. CONN. (N. Y. State Expt. Sta.). (*Science, 96 (1942), No. 2500, pp. 493–494*).

Detergents and staining of bacteria, S. F. SNIESZKO. (Univ. Maine.) (*Science, 96 (1942), No. 2504, p. 589*).—In preparations on slides cleansed of dust particles with cloth the distribution of bacteria and arrangement of flagella were found most satisfactory when a small amount of detergent ("Aerosol OT" in aqueous or "Aerosol MA" in saline solution) was added.

The microbe as a biological system, S. A. WAKSMAN. (N. J. Expt. Stas.). (*Jour. Bact., 45 (1943), No. 1, pp. 1–10*).—This address deals essentially with advance in the study of "the microbe and its neighbors." Any attempt to elucidate the interrelations making up a complex microbiological population must consider a number of factors: (1) Availability and utilization of nutrients; (2) competition; (3) environal effects; and relationships (4) in homogeneous v. heterogeneous populations, (5) young v. old cells, (6) forms resistant v. sensitive to attack by destructive agents, (7) symbiotic v. nonsymbiotic forms, and (8) parasites v. saprophytes. Among these interrelationships, those of association and antagonism are discussed in most detail. In these two fields lie great possibilities of application, such as domestication of micro-organisms for disease control, isolation of new chemotherapeutic agents, utilization of microbial activities for controlling certain plant diseases, and the elucidation of many complex natural processes hitherto shrouded in mystery.

Phosphorylated carbohydrate esters in autotrophic bacteria, G. A. LePage and W. W. Umbreit. (Univ. Wis.). (*Jour. Biol. Chem., 147 (1943), No. 2, pp. 263–271, illus. 1*).—From the tabulated summary of the fractionation of the P compounds described in the text for the autotrophic *Thiobacillus thiooxidans,* it is apparent that a large part of the acid-extractable P is composed of phosphorylated carbohydrate esters identical in chemical properties to those of yeast and muscle. If it is granted that the presence of these compounds in an autotrophic cell means that they play an important role in its metabolism, it would seem possible to conclude that the internal metabolism of such a cell is markedly similar if not identical to heterotrophic tissues.

Iron requirements of heterotrophic bacteria, W. S. Waring and C. H. Werkman. (Iowa State Col.). (*Arch. Biochem., 1 (1943), No. 3, pp. 425–433, illus. 1*).—The exact Fe requirements for growth of six bacterial species were determined and found to vary with the type of cytochrome system. The Fe contents of cells in the presence of variable concentrations of Fe salt and the availability of different soluble and highly insoluble Fe compounds were also determined. Analyses of common constituents of culture media indicated that the traces of Fe were considerable and adequate for the bacteria used.

Bacterial assimilation of acetic and succinic acids containing heavy carbon by Aerobacter indologenes, H. D. Slade and C. H. Werkman. (Iowa Expt. Sta.). (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 1, pp. 65–66*).

Studies on the myxobacteria.—III, The utilization of carbohydrates, J. M. Beebe. (Iowa Expt. Sta.). (*Iowa State Col. Jour. Sci., 17 (1943), No. 2, pp. 227–240*).—Following studies previously noted (E. S. R., 86, p. 761), the more complex carbohydrates such as cellulose, starch, dulcitol, and inulin were found readily utilized by the species of *Myxococcus, Chondrococcus, Podangium,* and *Polyangium* studied. The pentoses were highly inhibitory and the hexoses only slightly less so, but the disaccharides had little effect on the growth of these bacteria. The pH of none of the media used was lowered sufficiently to give an acid reaction with bromocresol purple. Though apparently more favorable to vegetative growth than reprecipitated cellulose, starch did not encourage fruit body formation. It was broken down within the area of growth. No indication of cellulose decomposition was noted. Agar is a possible source of both C and N, but no liquefaction or other sign of partial or complete break-down was observed. Addition of inorganic N salts to the media had no significant effect on growth, but it was possible that sufficient N was present in the agar to permit good growth. Aside from the normal intestinal flora the constituents of dung apparently useful to the myxobacteria were the undigested long chain carbohydrates such as cellulose, the water-soluble parts of dung appearing to be of little value. There are 22 references.

Action of inhibitors on hydrogenase in Azotobacter, J. B. and P. W. Wilson. (Univ. Wis. et al.). (*Jour. Gen. Physiol., 26 (1943), No. 3, pp. 277–286, illus. 4*).—The inhibitors usually associated with activity of the cytochrome oxidase system—cyanide and CO—were also found effective in reducing oxidation of H_2 by intact cells of *A. vinelandii.* The hydrogenase system is more sensitive to CO than is the respiratory system. Oxidation of a C source and of H by *Azotobacter* cells is inhibited in a quantitatively different manner by sodium azide, hydroxylamine, sodium iodoacetate, and sodium fluoride. In every case, a concentration range definitely inhibitory for respiration had little or no effect on the hydrogenase activity. The differential inhibition by hydroxylamine explains certain published observations erroneously interpreted as demonstrating a specific inhibition by NH_2OH of biological N fixation. The differential inhibitors can be used for detecting hydrogenase in cultures possessing a high endogenous respiration. The method is illustrated by an experiment with root nodule bacteria from pea and cowpea nodules. No hydrogenase was found in either.

An apparatus for studying respiration of Azotobacter in relation to the energy involved in nitrogen fixation and assimilation, J. M. Fife (Calif. Expt. Sta. et al.). (*Jour. Agr. Res.* [*U. S.*], *66* (*1943*), *No. 6, pp. 229–248, illus. 9*).—The differential calorimeter described was rebuilt so that the heat and CO_2 liberated by a bacterial culture could be measured simultaneously over partial O_2 pressures of 0.001–1 atmosphere. It was so designed that a culture could be vigorously aerated with any gas mixture, such aeration, assisted by the rapid mechanical stirring, presenting such an enormous gas-liquid interface that adequate O_2 at the partial pressure in question was insured and at the same time the CO_2 was effectively removed as formed. The heat and CO_2 produced could be measured accurately over long periods This calorimeter was so sensitive that sudden changes in respiratory rate caused by variations in partial O_2 pressure were quickly revealed by heat measurements. The study demonstrates the need of vigorous aeration and stirring to obtain a maximum respiratory rate. With a constant partial O_2 pressure approaching that in the air, the growth phases of an *Azotobacter* culture were accurately followed. From the CO_2 produced and the O_2 consumed (calculated from calories evolved) the respiratory quotient of *Azotobacter* was determined when the partial O_2 pressure was near that in air. These bacteria produced the maximum amount of heat possible from the O_2 utilized. This proved true even for old cultures, indicating that the efficiency of O_2 utilization per living cell remains constant with increasing culture age.

Antibacterial substances produced by moulds.—I, Penicidin, a product of the growth of a Penicillium, N. Atkinson (*Austral. Jour. Expt. Biol. and Med. Sci.*, *20* (*1942*), *No. 4, pp. 287–288*).—The method of production and preparation and some of the properties of an antibacterial substance, "penicidin," inhibitory to both gram-positive and gram-negative organisms are described.

Purification and properties of the second antibacterial substance produced by Penicillium notatum, W. Kocholaty (*Science*, *97* (*1943*), *No. 2512, pp. 186–187*).—In further studies (E. S. R., 88, p. 460) of the antibacterial substance penatin, progress is reported in its purification. Its bacteriostatic power not only surpasses the purest preparations of penicillin, but it is also effective against bacteria not appreciably susceptible to the latter, notably some gram-negative organisms. None of the 50 organisms tested resisted the bacteriostatic action of penatin in dilutions of not less than 1 to 10 millions. It is also bactericidal, but to a lesser degree. So far as tested in laboratory animals, no ill effects were observed.

Another mould with anti-bacterial ability, M. I. Timonin (*Science*, *96* (*1942*), *No. 2500, p. 494*).—A bacteriostatic substance giving a positive reaction for citrinin is reported from *Aspergillus* sp. of the *Candidus* group.

Agar-bearing seaweeds at La Jolla, California, R. H. Tschudy and M. C Sargent. (Univ. Calif.). (*Science*, *97* (*1943*), *No. 2508, pp. 89–90*).—Of the red algae collected in sufficient quantities to test and not previously considered as agar-bearing, *Gelidium cartilagineum*, *Endocladia muricata*, *Pterocladia* sp., and two of three species of *Gigartina* readily yielded agar by methods described.

Ceroxylon ferrugineum André, the Salento waxpalm, M. L. Bomhard. (U. S. D. A.). (*Jour. Wash. Acad. Sci., 33 (1943), No. 1, pp. 1–8, illus. 1*).

New names in Quercus and Osmanthus, E. L. Little, Jr. (U. S. D. A.). (*Jour. Wash. Acad. Sci., 33 (1943), No. 1, pp. 8–11*).

Species Batorum: The genus Rubus in North America.—V, Flagellares, L. H. Bailey (*Gentes Herbarum, 5 (1943), No. 5, pp. 231–422+, illus. 94*).—A continuation (E. S. R., 86, p. 751) of technical descriptions of *Rubus* spp., here including the dewberry group.

A technique for treating small seedlings with colchicine, R. C. Thompson. (U. S. D. A.). (*Plant Physiol., 18 (1943), No. 1, pp. 128–130, illus. 2*).—According to the petri dish method described the growing apex of the seedlings (lettuce used) are treated without subjecting the radicles and rootlets to the deleterious effects of the chemical, and a large number may be treated with a limited amount of labor.

Sexual hormones in Achlya.—V, Hormone A′, a male-secreted augmenter or activator of hormone A, J. R. Raper (*Natl. Acad. Sci. Proc., 28 (1942), No. 12, pp. 509–516, illus. 2*).—On the role of specific sexual hormones in the sexual reactions of two heterothallic species of this saprolegniaceous fungus.

The conversion of tryptophane to plant growth substance by conditions of mild alkalinity, S. A. Gordon and S. G. Wildman. (*Jour. Biol. Chem., 147 (1943), No. 2, pp. 389–398, illus. 1*).—Tryptophane heated for 7 hr. with NaOH at 0.25–0.00025 N concentrations readily yielded detected amounts of auxin, and heating 7 hr. in distilled water also converted tryptophane to auxin. Tryptophane in contact with 0.25 N NaOH for 15 min. was converted into auxin in increasing amounts with rises from room temperature to 80° C.; at higher temperatures, auxin formation rapidly decreased. Gelatin (—tryptophane) produced about equal amounts of auxin whether hydrolyzed with 0.5 or 0.05 N NaOH. Casein, which contains tryptophane, produced much larger amounts when hydrolyzed with 0.5 N than with 0.05 N NaOH. It is suggested that the tryptophane in proteins is a potential source of auxin when they are digested with alkali. Tryptophane is also rapidly converted to auxin under comparatively mild conditions of heat, pH, etc. Since recent methods of auxin extraction from plant tissues incorporate the use of alkaline conditions, it is suggested that they should be reviewed in the light of these results.

Measurement of small concentrations of ethylene and automobile exhaust gases and their relation to lemon storage, P. W. Rohrbaugh (*Plant Physiol., 18 (1943), No. 1, pp. 79–89, illus. 5*).—Methods are described for using the epinasty reaction of pea seedlings to measure small concentrations of ethylene in automobile exhausts or fruit storage rooms. The data indicate a close relationship between the amount necessary to color lemons and to cause epinasty to pea seedlings. The necessary concentration was found to lie between 0.025 and 0.05 p. p. m. of air. There are 18 references.

A light-tight box for making shadowgraphs of Avena seedlings for growth hormone determinations, R. E. Bennett, S. A. Gordon, and S. G. Wildman (*Plant Physiol., 18 (1943), No. 1, pp. 134–135, illus. 1*).—A simple box is described and illustrated for making shadowgraphs of oats seedlings easily and rapidly without leaving the constant-temperature-constant-humidity culture room.

The rôle of ascorbic acid in plant nutrition, G. H. Carroll (*Bot. Rev., 9 (1943), No. 1, pp. 41–48*).—A review (45 references).

Pyridoxin and coacervates in plant cells, H. S. Reed and J. Dufrenoy. (Univ. Calif. and La. State Univ.). (*Science, 96 (1942), No. 2499, p. 470*).—A note on the finding that pyridoxin may enter into the formation of characteristic aggregates in the vacuoles of senescent or poorly nourished cells. It is believed that a healthy condition depends on the presence of pyridoxin in the vacuole. Coacervates may therefore inactivate an important constituent of the cell system.

Effect of the root system on tomato stem growth, F. W. Went (*Plant Physiol., 18 (1943), No. 1, pp. 51–65, illus. 2*).—It was shown that if all the roots of a tomato or cosmos plant were submerged in a nutrient solution at pH 6 or higher, aeration could not prevent chlorosis and especially a drop in growth rate of stems, although root growth was satisfactory. However, as soon as a portion of the root system developed in moist air, stem growth attained its maximum. All data favored the conclusion that the part of the root system developing in moist air supplies one or more factors (tentatively termed "caulocalines") required for stem growth and prevention of chlorosis. "Thus, in intact plants, the aeration of roots seems to be of relatively greater importance for their caulocaline production than for salt uptake." There are 17 references.

Differential effect of nutrient solutions on the size of various parts of maize seedlings grown in the dark, J. H. Kempton. (U. S. D. A.). (*Jour. Agr. Res. [U. S.], 66 (1943), No. 5, pp. 183–228, illus. 34*).—In order to utilize the very open scale afforded by the mesocotyl as a measure of the growth substance and hence possibly the growth potentialities of the corn plant, a long series of experiments was conducted to determine the effects of temperature and of various radiations of known wavelength and energy on mesocotyl elongation. However, it was soon found that for comparative results there must be a rigid control of all environal conditions. Lack of agreement among repeated experiments and excessive variability of subgroups within experiments compelled increasing refinements in control of growth conditions leading eventually to a study of the effects of the solution itself on the developing seedlings.

Seedlings grown in nutrient solutions in the dark were benefited by certain salts, which increased the transfer rate and total translocation of the dry matter stored in the seed. Calcium salts stimulated mesocotyl elongation but did not produce the longest or heaviest leaves. Leaf growth was stimulated at the expense of the mesocotyl by all except Ca salts. Coleoptiles and leaves apparently reacted to the same solutions. Root dry weights were depressed by Ca salts and were not increased by any salts used. The effects produced depended on temperatures of 69°–90° F. In certain respects Ca salts were relatively less effective in stimulating growth at the lower temperature range.

Variation in the rate of elongation of the coleoptile of Zea mays, C. V. Krishna Iyengar (*Cur. Sci. [India], 11 (1942), No. 11, pp. 443–444, illus. 1*).—Fluctuations in growth rate of corn coleoptiles occurred at intervals of a minute or less, rather than at longer intervals of a few hours as noted by Friesner (E. S. R., 45, p. 528).

Über den Einfluss des Alters der Mutterpflanze auf die Bewurzelung der Stecklinge [Influence of age of mother plant on the rooting of cuttings], R. Turezkaya (*Compt. Rend. (Dok.) Acad. Sci. U. R. S. S., n. ser., 33 (1941), No. 1, pp. 78–80*).—From experiments with *Perilla nankinensis* and soybean it is concluded that at the initiation of blooming, growth substances are concentrated in the flowers and later in the fruit; the amounts in the stems are thus insufficient for root formation. However, when heteroauxin is artificially applied, it appears to substitute for the natural growth substance which is not present in the lower parts of the stem; the growth of the embryonic tissue is then stimulated and root formation results.

Use of tensiometers in measuring availability of water to plants, F. J. Veihmeyer, N. E. Edlefsen, and A. H. Hendrickson. (Univ. Calif.). (*Plant Physiol., 18 (1943), No. 1, pp. 66–78, illus. 11*).—Pot and field tests on sunflowers, strawberries, and Sudan grass, detailed results of which are presented, demonstrated that tensiometers can indicate the tensions for moisture contents in the upper one-third to one-half of the range between moisture equivalent and permanent wilting percentage. For the soils tested, the potential at the moisture equivalent, though difficult to evaluate exactly, was around 0.3×10^{6} ergs per gram. Attention is called to an error in reasoning found in the literature as regards evaluation of the pF and the potential of soil moisture at the moisture equivalent.

The supply of water to transpiring leaves, L. G. G. Warne (*Amer. Jour. Bot., 29 (1942), No. 10, pp. 875–884*).—From determinations (details presented and discussed) in a variety of plants it is shown that the water conductivity per unit area of foliage supplied varies according to species in the 16 studied. The tendency to develop the high tension found in the tracheae may be advantageous in that it facilitates water absorption and tends to restrict transpiration. The significance of a high osmotic pressure of the leaf cell sap is that it allows development of a high tension in the tracheae without the latter causing a flow of water from the living leaf cells to the veins. A high tension in the tracheal contents assists in maintaining a favorable water balance as long as it is accompanied by a high osmotic pressure in the leaf cells. There are 20 references.

Transpiration in American holly in relation to leaf structure, C. A. Swanson. (Ohio State Univ.). (*Ohio Jour. Sci., 43 (1943), No. 1, pp. 43–46*).—Under the same soil and air conditions, the holly leaf with its very thick cuticle had an average transpiration exceeding that of either tobacco or yellow coleus, both thin cuticles. The stomatal frequency, averaged for both upper and lower surfaces, was highest in tobacco and lowest in coleus. The internal leaf surfaces of holly, tobacco, and coleus were in the proportion of 12.9, 7.1, and 4.6, respectively. No close correlation between relative transpiration rates and the internal surface ratio was evident in these species. From studies on excised leaves supplied with water, it appeared that the relative importance of different leaf structures in affecting the rate of foliar water loss in different species varies with qualitative and quantitative differences in the environal conditions.

Protoplasmic streaming, W. Seifriz (*Bot. Rev., 9 (1943), No. 2, pp. 49–123*).—A comprehensive monographic review (225 references) of such streaming in both plants and animals from its discoverey in the mid-eighteenth century to the published works of the current decade.

The use of ion exchange materials in studies on corn nutrition, C. D. Converse, N. Gammon, and J. D. Sayre. (Ohio Expt. Sta. and U. S. D. A.). (*Plant Physiol., 18 (1943), No. 1, pp. 114–121, illus. 3*).—A new technic for plant nutrition studies is outlined, and illustrations of the type of results that may be obtained are given. The method permits addition of each major element separately. Growth responses and deficiency symptoms are said to be ascertained as easily as in solution cultures, but with responses and symptoms more definite than in previous culture methods.

Oxidation-reduction potentials of the tissue fluid of cabbage, E. Airola and J. W. Crist. (Mich. Expt. Sta.). (*Plant Physiol., 18 (1943), No. 1, pp. 107–118, illus. 2*).—The electric potential of the tissue fluid in normally grown plants was positive in character (dominance of oxidation over reduction) and varied within the range of +450 to +475 mv. The relationship between pH and Eh of the fluid was definite and regular, and expressible as a parabola, the equation of which was derived and is presented. Although inadequate as proof, tests of the effect of leaf position pointed to the potential being low in young leaves, highest at full development, and declining as leaves matured and began to age. The redox system gave an apparent response on exposure to low temperature (hardening) which, consistent within the test limits, was of the nature of a sharp drop in potential after 2–4 exposures, a slight rise with added exposures, and continuation at a level below that of unexposed and unhardened plants.

Diurnal changes in the carbohydrates of wheat leaves, G. Krotkov (*Canad. Jour. Res.*, *21* (*1943*), *No. 1, Sect. C, pp. 26–40, illus. 14*).—In some leaf samples there was a considerable decrease in sugars under starvation; on the other hand samples taken in the first part of the day or after sunset usually contained more sugars after than before starvation. The last observation suggested a considerable hydrolysis of complex substances in the leaves, with the consequent appearance of sugars. Analysis of the data led to the conclusion that the observed diurnal variations in the extent of hydrolytic and synthetic activities of leaves, or in translocation of sugars, are greatly influenced by light conditions.

The energy changes associated with plant respiration, K. Wohl and W. O. James (*New Phytol.*, *41* (*1942*), *No. 4, pp. 230–256*).—This is a comprehensive review (63 references) and critical analysis of the data, from which it is concluded that plant respiration is accompanied by a continuous decrease of free energy which appears to be a prerequisite to the continuation of life. Thermodynamically, the free energy is not appreciably used in doing work. Apart from trifling exceptions the heat generated is useless to the plant and to be regarded as an end product of metabolism. During its degradation the free energy of the sugar molecule produces numerous changes (mostly chemical) inside the living tissues. The minute subdivisions and intimate linkages of the metabolic reactions secure the performance of syntheses requiring free energy by means of reactions (usually oxidations) able to supply it. Other vital processes such as organization, salt accumulation, cell division, protoplasmic rotation, and many others involve the turn-over of much smaller amounts of energy which they obtain indirectly from respiration. The decrease of free energy may be in excess of their requirements and yet remain wholly unavailable if the reaction sequence is unsuitable. The large energy turn-over of anaerobic respiration is almost useless to the plant for this reason.

Tyrosinase and plant respiration, D. Baker and J. M. Nelson (*Jour. Gen. Physiol.*, *26* (*1943*), *No. 3, pp. 269–276, illus. 5*).—Evidence presented supports the conclusion that at least 85 percent of the O_2 uptake of respiring potato tuber tissue enters the chemistry of the cell via a tyrosinase-catalyzed oxidation.

Rate of photosynthesis and respiration of the leaf in relation to its age, T. V. Voblikova (*Compt. Rend.* (*Dok.*) *Acad. Sci. U. R. S. S.*, *n. ser.*, *33* (*1941*), *No. 1, pp. 76–77*).—In tests with a spinach leaf under artificial light the photosynthetic and respiratory rates varied inversely with age of leaf. Similar results on several other leaves led to the conclusion that at least under artificial light the gas metabolism of a leaf gradually decreases after the blade has reached about half its maximum size.

State of chlorophyll in the chloroplast, B. N. Singh and N. K. Anantha Rao (*Cur. Sci.* [*India*], *11* (*1942*), *No. 11, pp. 442–443*).—The presence of protein and lipoids in chloroplasts from bean leaves, chlorophyll solubility in lipoids, formation of fluorescent sols of chlorophyll with lipoids, and loss of fluorescence of living chloroplasts on enzymic destruction of its protein and lipoids, all suggested the possibility that in the chloroplast chlorophyll may be dissolved in a lipoid colloidally dispersed over the proteinaceous groundwork, thus leading to an intimate association with both proteins and lipoids.

A simplified integrating light recorder for field use, V. G. Sprague and E. M. Williams. (U. S. D. A. coop. Pa. State Col. et al.). (*Plant Physiol., 18 (1943), No. 1, pp. 131–133, illus. 2*).—A slight modification (E. S. R., 86, p. 759) for use with dry batteries to render it portable.

Effect of nutrient cultures on the reaction of maize seedlings to light, J. H. Kempton. (U. S. D. A.). (*Jour. Wash. Acad. Sci., 32 (1942), No. 11, pp. 338–341, illus. 4*).—The nutrient culture used in the single experiment reported upon was that given by Eaton (E. S. R., 76, p. 305) at double his concentration and modified by increasing KH_2PO_4 by a factor of 10. The roots failed to respond to the solution. Exposure to 100 footcandle-hr. of Mazda light significantly increased the coleoptile length in the distilled water culture, but only slightly in the solution. This light affected the weight of the mesocotyl and tops but not the total amount of dry matter translocated. Light did not increase the speed with which dry matter was moved from the seed but determined its destination by initiating the development of leaves. Mesocotyl elongation is presumably controlled by growth substances released from the coleoptile, which are inactivated by light. It therefore follows that the resistance of these substances to light must have been altered by the salts in the solution or else their formation must have been reduced. In view of the very evident stimulation of elongation by the salts in solution, the latter assumption is not urged. Other detailed results are discussed.

Stimulative effects of X-rays on plants, H. J. Kersten, H. L. Miller, and G. F. Smith (*Plant Physiol., 18 (1943), No. 1, pp. 8–18, illus. 11*).—Using a seedling germination apparatus fulfilling requirements for adequate sampling to secure reliable conclusions, it was possible to obtain an apparent X-ray-induced stimulation in the primary root growth of corn seedlings. Statistical analysis of the data indicated beyond reasonable doubt that such stimulation was obtained by irradiating dry seeds at voltages around 17.5–20 peak kv. It was also shown that differences as much as those observed would occur in fewer than 5 cases in 100 if the treatment made no essential difference in root growth. There are 21 references.

Estimation of stomated foliar surface of pines, T. T. Kozlowski and F. X. Schumacher (*Plant Physiol., 18 (1943), No. 1, pp. 122–127, illus. 1*).—The surface area of a population of pine needle fascicles was found to be readily calculated (detailed procedures given) through its correlation with volume, a value more easily determined by displacement, and a formula is presented for the linear relationship ascertained for needle fascicles of loblolly and eastern white pines. In establishing the graphic relationship between surface and volume of needle fascicles from a sample, a microcaliper may be used to obtain diameter measurements along fascicles. Thread ligatures are suggested as aids in obtaining diameter measurements.

GENETICS

Principles of genetics, H. L. Ibsen (*St. Louis, Mo.: John S. Swift Co., [1942], pp. 118+, illus. 9*).—This planographed presentation sets forth the physical basis of heredity and genetic principles, involving the transmission of the determiners of characters from parent to offspring. Considerable attention is given to sex determination.

Influence of the environment on the expression of hereditary factors in relation to plant breeding, S. H. Yarnell. (Tex. Expt. Sta.). (*Science, 96 (1942), No. 2501, pp. 505–508*).—This review presents a general summary of the subject.

Color inheritance in barley, J. L. Myler and E. H. Stanford. (Calif. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 5, pp. 427–436*).—Crosses were made between Blackhulless and C. I. No. 5628 barleys with purple pericarp and Algerian, Kwan, Awnless, and Bolsheviki, all with blue aleurone layer, and Goldfoil, Hanna, Nepal, and C. I. No. 5649, all with white aleurone layer. Blackhulless and C. I. No. 5628 were shown to have the same factor for purple (*Pp*), which is linked with non-six-rowed v. six-rowed (*Vv*) with 13.19 percent crossing over and thus is in group I. One of two complementary factors for blue aleurone reported, previously studied by Robertson et al. (E. S. R., 67, p. 375) and Buckley (E. S. R., 63, p. 23)', designated *Blbl*, is linked with hooded v. awned (*Kk*) and was placed in linkage group IV. A second factor for blue, Bl_1bl_1 was linked with hulled v. naked (*Nn*), which placed it in linkage group III. *Oo* for white v. orange lemma was inherited independently of factors representing linkage groups I, III, IV, and V. The factorial constitution of the 10 varieties for pericarp and aleurone color is given.

Inheritance of reduced lateral spikelet appendages in the Nudihaxtoni variety of barley, W. H. Leonard. (Colo. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 3, pp. 211–221, illus. 2*).—The variety classified previously as *Hordeum intermedium nudihaxtoni* was found to be a six-rowed barley differing from ordinary six-rowed varieties by a factor for reduction of lateral spikelet appendages, i. e., awns in this case. The factor pair *Lr lr* was inherited as a single-factor difference, normal being dominant over reduced appendages (hoods or awns) in crosses studied. Normal appendages on the lateral spikelets occur only in the presence of *vv* (six-row). The interrelationship of *Lr lr* with *Or or* (green v. orange seedlings) located in group I indicated linkage with a recombination value of 38.58±1.20 percent. *Lr lr* was inherited independently of factors known to be located in the other six linkage groups.

Location of glossy and yellow seedlings in two linkage groups, D. W. Robertson and O. H. Coleman. (Colo. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 11, pp. 1028–1034*).—Glossy 2 (Gl_2gl_2) is a simple Mendelian factor pair for green v. glossy plant, and the entire plant is glossy. L. J. Stadler selected it as homozygous recessive from Himalaya treated with X-ray. Gl_2gl_2 is located in group IV in the order *Ii*, *Kk*, and Gl_2gl_2. Faust I barley contains a factor pair (Yy^x) for green v. yellow seedlings, the seedling character being inherited as a simple recessive, and the color is chartreuse yellow. Yy^v is an allele of *Yy* for green v. virescent seedling found in Minnesota 72–8. It is located in group I in the order *VV*, Yy^v, *Ff*, and *Or or*. Gl_2gl_2 and Yy^x were found to be inherited independently of factor pairs located in groups other than IV and I, respectively.

Linkage relationships between the allelomorphic series B, B^{mb}, B^g, and A_ta_t factors in barley, R. W. Woodward. (U. S. D. A. coop. Utah Expt. Sta.), (*Jour. Amer. Soc. Agron., 34 (1942), No. 7, pp. 659–661*).—Crosses of representative varieties of the four black color classes (E. S. R., 86, p. 171) and Trebi barley all showed linkage between A_ta_t albino and the *B*, B^{mb}, B^g allelomorphic color factors, with respective cross-over values of 35, 38.9, 36.6, and 39.2 percent. The cross-over value of 36.7 percent between the A_ta_t and the black series v. white color pairs was determined.

Distribution of yields of single plants of varieties and F_2 crosses of barley, F. R. Immer. (Minn. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 9, pp. 844–850, illus. 2*).—The type of distribution of single plant yields, as measured by the *k* and *g* statistics, was determined for Barbless, Velvet, Peatland, and Korsbyg barleys and four F_2 crosses. Distribution curves were positively skew but lacked kurtosis. Variation in yield of single plants in spaced progeny rows evidently is determined almost completely by environmental factors.

General vs. specific combining ability in single crosses of corn, G. F. Sprague and L. A. Tatum. (Iowa Expt. Sta. coop. U. S. D. A.). (*Jour. Amer. Soc. Abron., 34 (1942), No. 10, pp. 923–932*).—In single crosses involving previously tested lines, genes conditioning specific combining ability had the most effect in determining yield differences; while in material previously untested, genes affecting general recombining ability were of most importance. A method for evaluating the relative importance of genes contributing to general and specific combining ability in yield of single crosses is presented.

The relation between the vitamin-A-active carotenoids in corn and the number of genes for yellow color, A. R. Kemmerer, G. S. Fraps, and P. C. Mangelsdorf. (Tex. Expt. Sta.) (*Cereal Chem., 19 (1942), No. 4, pp. 525–528*).—While the number of genes of yellow color in corn (E. S R., 65, p. 216) was shown to affect directly the amount of vitamin-A-active carotenoid pigment, it had no significant influence on the relative proportions of the different constituents α–, β–, and K–carotene and cryptoxanthin.

Cytological and genetic studies of sterility in inbred and hybrid maize, F. J. Clark (*Connecticut [New Haven] Sta. Bul. 465 (1942), pp. 703–726, illus. 9*).—Eighteen of the progenies of 36 semisterile ears occurring spontaneously among corn hybrids transmitted the sterility to the next generation, 4 showed doubtful transmission, and 14 did not transmit the sterility. Six translocations, an inversion, and three factors for lethal gametes were found among progenies transmitting sterility. Cytological analysis of five inbred lines of dent corn to determine causes of sterility showed two to be characterized by variable amounts of asynapsis, one to have a small inversion, and one homozygous for a translocation. The fifth inbred, studied in relation to a degenerative type of ear development, had anthers with most sporocytes with normal chromosomes and a few sporocytes with heterozygous translocations.

Breeding corn hybrids for smut resistance, G. H. Stringfield and D. H. Bowman. (U. S. D. A. and Ohio Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 5, pp. 486–494, illus. 3*).—Counts in 48 corn performance experiments in Ohio showed that about three-fourths of the hybrid entries carried less smut infection than did open-pollinated varieties in the same tests. Hybrids in which half or more of the parentage consisted of 12 resistant inbred lines showed less than a third as much smut as did open-pollinated varieties. Hybrids developed, combining a high degree of smut resistance with other desirable agronomic characters, are being grown extensively. The use of these and similar hybrids in other States is held to constitute the first significant advance in the control of corn smut.

The fusion of broken ends of chromosomes following nuclear fusion, B. McClintock (*Natl. Acad. Sci. Proc., 28 (1942), No. 11, pp. 458–463*).—In experiments with corn it was found that two chromosomes do not have to be in contact at the time of breakage in order that fusions may occur between their broken ends, and that the broken ends are capable of fusion with any other unsaturated broken end. Observations also imply that some force exists which accounts for the fusion of the unsaturated broken ends, and it is certain that the unsaturated state does not persist indefinitely.

Anent the origin of sweet corn, A. T. Erwin. (Iowa Expt. Sta.). (*Canning Trade, 65 (1943), No. 30, pp. 15–16, 20*).—Information from archeology, Indian legends, genetic studies, and early-American literature is cited.

Some genetic and morphologic characters affecting the popping expansion of popcorn, P. J. Lyerly. (Iowa Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 11, pp. 986–999, illus. 1*).—Popping expansion of a popcorn inbred gave a fairly reliable index of its general performance in hybrid combinations,

i. e., crosses of high-expansion inbreds tended to give high-expansion combinations, of low-expansion inbreds tended to be low, and high- × low-expansion inbreds tended to be intermediate. The mean of a group of hybrids approached the mean of the parental inbreds. Weight, length, and width of seeds were correlated negatively with popping expansion, and thickness and density of seeds exhibited slight positive correlations therewith. Effects of xenia on popping expansion were too slight to be a serious source of error in comparative yield trials.

Genetical consequences of the chromosomal behavior in orchard grass, Dactylis glomerata L., W. M. Myers. (U. S. D. A. et al.). (*Jour. Amer. Soc. Agron., 33 (1941), No. 10, pp. 893–900*).—The results reported are in agreement with the hypothesis of tetrasomic inheritance in *D. glomerata*, a type of inheritance expected from the meiotic behavior in this species.

Heritable variations in seed set under bag among plants of orchard grass, Dactylis glomerata L., W. M. Myers. (U. S. D. A.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 11, pp. 1042–1051*).—Numbers of seeds per panicle set under bag and with open pollination were determined on 46 replicated parental clones and their first-generation inbred (I_1) progenies. Parental clones ranged from 1 8 to 145.6 seeds per panicle set under bag, and the parent-inbred progeny correlation coefficient for this character was r=0.618, D/F=44. Average number of seeds per panicle was 40.2 for the clones and 14.9 for inbred progenies. No simple Mendelian basis for inheritance of ability to set seed under bag could be postulated. Comparisons of parent with inbred progeny showed a reduction accompanying inbreeding in number of seeds set with open pollination. With selfed seed set expressed as percentage of open seed set, parental clones ranged from 0.8 to 54.5 percent, and the parent-progeny correlation coefficient was r=0.677. Reduction in percentage seed set of inbreds as compared with parental clones was not significant statistically. Within inbred families, vigor was not correlated closely with ability to set seed under bag.

The occurrence and inheritance of certain leaf "spots" in Sudan grass, R. J. Garber and S. J. P. Chilton. (U. S. D. A.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 7, pp. 597–606, illus. 4*).—Leaf spots observed on selfed lines of Sudan grass grown in the nursery at State College, Pa., during 1941 are described, with data on inheritance of three types of spotting. No possible causal organisms were isolated in connection with these leaf spots. F_2 and F_3 data from crosses and observations among selfed lines indicated that the particular leaf spots under observation are conditioned by inheritance, which is not simple. Leaf spots vary in size, shape, and number and in time and place of appearance on the plant. Inheritance of red and tan color was monohybrid with red dominant..

Effects of self-pollination in sweet clover, E. E. Hartwig. (Ill. Expt. Sta. coop. U. S. D. A.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 4, pp. 376–387, illus. 4*).—A number of open-pollinated and selfed populations of *Melilotus officinalis* and *M. alba* and one family of *M. taurica* and two of *M. suaveolens* were compared for mature height, stem number, date of first bloom, seed production, and disease reaction. Each of these species appeared to be highly cross-pollinated. In *M. officinalis* there was a decided decrease in vigor when S_1 plants were compared with their open-pollinated sibs, expressed by decreased height, stem number, and ability to produce seed even when pollinating insects were plentiful. Very similar results followed selfing of *M. alba*. Loss of vigor upon selfing was great enough to preclude the possibility of isolating superior inbred lines which may be increased as varieties. Procedure suggested for developing a synthetic variety emphasizes selection among S_2 lines with later recombination of the best lines.

Production and value of polyploid field roots, J. M. Armstrong (*Sci. Agr., 22 (1942), No. 12, pp. 787–798, illus. 2*).—Tetraploid plants of Cesina sugar beets, Tip Top mangels, and Laurentian swedes, obtained by treating germinating seed with colchicine, were crossed inter se and with diploids. In yield trials of the several chromosome types, diploids yielded better than tetraploids and triploids were intermediate. The various sugar beet chromosome types did not differ significantly in percentages of dry matter or sugar content. Green weight and percentage sugar in sugar beets were negatively correlated and dry matter and sugar content positively correlated. The conclusion was that in the varieties of field roots investigated, development of tetraploid strains would serve no practical purpose.

Natural self-pollination in cucumbers, J. M. Jenkins, Jr. (S. C. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 40 (1942), pp. 411–412*).—By the use of two contrasting varieties, (1) an inbred line producing red-colored fruits with black spines and (2) a line with cream-colored fruits with white spines, it was established that when planted in adjacent rows 6 ft. apart the amount of natural crossing was 32.9 percent. In the two varieties the red color of fruit and black color of spines were dominant over the cream color and white spines.

The genetic nature of X-ray induced changes in pollen, C. M. Rick. (Univ. Calif.) (*Natl. Acad. Sci. Proc., 28 (1942), No. 12, pp. 518–525, illus. 1*).—It is concluded from experimental results with pollen of *Tradescantia* spp. that size and variability are, at least in part, genetically self-determined and that the changes observed were the consequence of mutations induced by the X-ray treatment. These conclusions were supported by an analysis of genetic variation of pollen length in garden peas.

Prevention of field hybridization in the lima bean, R. Magruder and R. E. Wester. (U. S. D. A.). (*Amer. Soc. Hort. Sci. Proc., 40 (1942), pp. 413–414, illus. 1*).—A brief description is presented of a method used successfully at the U. S. Horticultural Station, Beltsville, Md., for preventing crossing in the lima bean.

Somatic mutations in the apple, J. K. Shaw and L. Southwick. (Mass. State Col.) (*Science, 97 (1943), No. 2513, p. 202*).—Many somatic mutations in the apple differ only in fruit color pattern and cannot be distinguished by growth characters. The McIntosh apple has produced many color mutations, varying from distinctly striped to uniform red. Two of these McIntosh mutations propagated by the Massachusetts Experiment Station for several years produced highly similar fruit of solid red color and cannot be separated by growth characters; yet when propagated on a clonal stock (Spy 227), one proved compatible, while in the other all buddings were dead or dying by midsummer. In a like manner, Stayman Winesap and Winesap were incompatible with Spy 227.

Animal breeding plans, J. L. Lush (*Ames, Iowa: Collegiate Press, Inc., 1943, 2. ed., [rev.], pp. 437+, illus. 50*).—The revised edition of this book (E. S. R., 77, p. 227) includes clarification of the less easily understood ideas on animal breeding. The newer ideas of selection indexes are emphasized. The portions on how to form and efficiently utilize distinctive families have been expanded as greater use has been made of the results of tests in the regional laboratories for sheep, swine, and poultry.

Graphic method showing efficiency of dairy bulls, F. B. Headley. (Nev. Expt. Sta.). (*Jour. Dairy Sci., 25 (1942), No. 12, pp. 1001–1002, illus. 1*).—The increase or decrease of a sire's daughters' production over their dams may be shown graphically to bring out clearly whether a sire is increasing or decreasing the herd production.

Gene-interactions in cattle crosses: Some Ayrshire characteristics determined by crosses with the Holstein and Guernsey breeds, L. O. Gilmore, W. E. Petersen, and J. B. Fitch. (Minn. Expt. Sta.). (*Jour. Hered., 33 (1942), No. 12, pp. 451–453, illus. 2*).—Observations of the color pattern of 10 Holstein × Ayrshire and 4 Guernsey × Ayrshire crossbreds showed the gene causing regularity of outline of the Holstein pattern to be dominant or epistatic to the more or less irregular pattern of the Ayrshire and Guernsey breeds. The pigmentation is largely accounted for on the little white (*lw*) factor hypothesis and black on the leg extremities (*Pl*) factors of Ibsen (E. S. R., 70, p. 605). In preliminary crosses the character of the horns appeared to follow the Ayrshire type.

Proportionate dwarfism in Jersey cows, S. W. Mead, P. W. Gregory, and W. M. Regan. (Univ. Calif.). (*Jour. Hered., 33 (1942), No. 11, pp. 411–416, illus. 2*).—Among inbred Jersey cattle (E. S. R., 88, p. 611) a new type of proportionate dwarfism was found to occur in 4 cows sired by 1 bull. When the bull was bred to his own daughters there were produced 12 ♀ progeny, of which 6 died, 4 were normal, and 2 were dwarfed. In matings to unrelated cows there were produced 8 normal and 2 dwarf heifers. At birth the heifers were small but within the normal range in appearance, weight, height, and heart girth. The dwarfs grew more slowly than normal inbred and outbred sibs, but they were not identified until about 12 mo. of age. After the growth curve plateau the mean weight of inbred dwarfs was approximately 150 lb. less than the mean weight of inbreds, and the outcrossed dwarfs 200 lb. less than of the normal sibs. All dwarfs identified were heifers, but all except 1 ♂ were destroyed at birth. Dwarfism is considered due to an autosomal recessive gene. In general, the dwarfs were good milk producers but reproduction was poor.

Bowed pastern in Jersey cattle, F. W. Atkeson, F. Eldridge, and H. L. Ibsen. (Kans. State Col.). (*Jour. Hered., 34 (1943), No. 1, pp. 25–26, illus. 2*).—An anomaly of the rear pastern of registered Jerseys occurred in positive or questionable cases in 27 of 102 animals observed. It could be caused by a heterozygous condition of a dominant gene or a recessive gene.

Breeding and improvement of dairy cattle.—I, Reproduction and breeding efficiency. II, Mechanisms of inheritance. III, Systems of breeding and selection, V. A. Rice. (Mass. State Col.). (*Guernsey Breeders' Jour., 62 (1942), Nos. 6, pp. 453–456, 465, illus. 5; 9, pp. 814–817, illus. 2; 10, pp. 894–896, 908, illus. 2; 11, pp. 966–969; 12, pp. 1066–1068, 1079, illus. 1*).—General information is given on reproduction, breeding, inheritance, selection, and improvement in strains of dairy cattle.

Comparative lengths of the gestation periods of Aberdeen-Angus and Hereford cows carrying purebred and crossbred calves, D. C. Rife, P. Gerlaugh, L. Kunkle, G. W. Brandt, and L. H. Snyder. (Ohio Expt. Sta.). (*Jour. Anim. Sci., 2 (1943), No. 1, pp. 50–52*).—The average gestation periods were for purebred Hereford calves 289 days, purebred Angus calves 272.8 days, and crossbred calves produced by mating Angus and Hereford bulls to the dams of the other breed 281.4 days. These data were based on breeding records of over 20 Hereford and Angus cows each producing purebred calves one year and crossbred calves the second year.

Does crossbreeding produce better beef cattle? J. H. Longwell (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 3, pp. 12–14*).—Calves sired by Shorthorn bulls were heavier at birth and at 6 and 12 mo. of age than calves sired by Angus bulls with the dams of the same and opposite breeds. No evidence of hybrid vigor appeared. The data were based on lots of about 30 purebred calves of each breed of both sexes. There were available about 20 crossbred calves sired by the bulls of both breeds.

Effects of pituitary gonadotropins on the ovaries and the induction of superfecundity in cattle, L. E. Casida, R. K. Meyer, W. H. McShan, and W. Wisnicky. (Wis. Expt. Sta.). (*Amer. Jour. Vet. Res., 4 (1943), No. 10, pp. 76–94, illus. 4*).—The effects of pituitary materials, singly and in different combinations, in inducing ovulation were tested over a period of several years on calves, normal cows, and cows with incomplete or questionable breeding histories. There were injected subcutaneously and intravenously unfractionated and fractionated extracts from sheep pituitaries. The latter included follicle-stimulating and luteinizing hormones. Ovulation was more readily induced in cows and calves by subcutaneous injection of unfractionated pituitary extracts or follicle-stimulating hormone followed by intravenous injection of luteinizing extract than by either alone. Such ova were fertilizable, but the rate of fertilization in calves was low. The corpora lutea produced following these ova persisted as long as 23 days, but disappeared by 40 days after the beginning of the treatment. The maximum ovarian response obtained in cows and calves was sixtyfold, but the size of the ovary was variable and corpora lutea were produced with more surety than any range of ovarian size. Neither excessive follicle stimulation nor the formation of extra corpora lutea favored abortion. When unfractionated sheep pituitary extract was injected into two cows daily for 35 and 40 days, the weights of the ovaries were excessive. These cows went off feed at 24 and 37 days, respectively, and large amounts of fluid were collected in the abdomen. In other tests, fertility was low in cows caused to ovulate during the last part of the oestrous cycle. There was some evidence of early fetal death in cases of superfecundity.

A note on the inheritance of short lower jaw or parrot mouth in sheep, R. B. Kelley (*Jour. Council Sci. and Indus. Res.* [*Austral.*], *15 (1942), No. 3, pp. 189–190, illus. 1*).—A condition involving a shortened lower jaw appeared in sheep when a ram was bred to his daughters or a son and daughter of this ram were bred together. The abnormality was recessive and was so pronounced as to prevent rearing in some cases. In matings with unrelated ♀s the ram produced 78 normal progeny.

The relative importance of heredity and environment in the growth of pigs at different ages, M. L. Baker, L. N. Hazel, and C. F. Reinmiller. (Nebr. Expt. Sta. coop. U. S. D. A.). (*Jour. Anim. Sci., 2 (1943), No. 1, pp. 3–13, illus. 2*).—Analyses of the variance in the weights and gains of 994 pigs produced by 62 sires in 259 litters showed that heredity played an increasingly important role from birth to 112 days of age, but its importance decreased thereafter. From the variance of the weights and gains between pigs produced by the same sires, between litters by the same sire, and between litter mates, the role of heredity, litter environment, and environment peculiar to the individual were ascertained. Changes with development were thus indicated. Spring and fall farrowing proved unimportant sources of weight variation at any of the ages. "The relative influence of environment peculiar to the individual in determining weight decreased from 51 percent at birth to 34 percent at 84 days, increasing thereafter to 51 percent at 168 days. The relative importance of litter environment in determining weight decreased regularly from 49 percent at birth to 24 percent at 168 days."

The efficiency of three methods of selection, L. N. Hazel and J. L. Lush. (Iowa Expt. Sta.). (*Jour. Hered., 33 (1942), No. 11, pp. 393–399, illus. 2*).—Statistical consideration of the possibilities of these methods led to the conclusion that selection for (1) total score or (2) index of net desirability was much more efficient than (3) the tandem method. A total score based on *n* equally important, uncorrelated traits is $\sqrt{n}$ times as efficient as the tandem method. The progress was only $\frac{1}{\sqrt{n}}$ times as rapid as when selection was directed at that trait alone. Selection for several traits by using independent culling levels, in which a minimum for each trait was complied with, was more efficient than selection for one trait at a time.

Transplantation and individuality differentials in inbred strains of rats, L. LOEB, H. D. KING, and H. T. BLUMENTHAL (*Biol. Bul., 84 (1943), No. 1, pp. 1–12*).—Study of the reaction to transplantation of tissues within and between two inbred strains of rats showed a gradual increase in the homozygous condition. The advance was slight in the first 67 generations of brother × sister matings, but some advance was made between the sixty-seventh and one hundred and second generations. The reaction and success in transplanting tissues served as the criterion for homozygosity, somewhat as was done with inbred guinea pigs (E. S. R., 66, p. 817).

Difference in response of certain strains of rats to augmentative gonadotropic effect, J. D. HAUSCHILDT and J. S. EVANS (*Soc. Expt. Biol. and Med. Proc., 50 (1942), No. 2, pp. 353–355*).—Three strains of rats, the Sprague-Dawley, Wistar, and Sherman, were shown to give comparable responses to the gonadotropins of the pituitary, pregnant mare serum, and pregnancy urine administered singly, but they showed marked differences in sensitivity to the synergistic action of the follicle-stimulating hormone given with prolan or pregnant mare serum as indicated by Evans et al. (E. S. R., 69, p. 511). As ascertained by groups of 10 rats each, only the Sprague-Dawley and Wistar strains showed augmentation responses to the follicle-stimulating hormone of prolan or pregnant mare serum.

The manifold effects of the screw tail mouse mutation: A remarkable example of "pleiotropy" in genetically uniform material, E. C. MACDOWELL, J. S. POTTER, T. LAANES, and E. N. WARD (*Jour. Hered., 33 (1942), No. 12, pp. 439–449, illus. 6*).—An anatomical study of screw-tail mice (E. S. R., 86, p. 765) showed the monohybrid autosomal gene to produce abnormalities in the tail, pelvis, vertebrae, sternum, mandibles, molar and incisor teeth, ears, eyes, skull, feeding habits, mortality, size, and fertility. Among 2,998 young, 22.6 percent screw tails were produced—the progeny of normals that had produced some screw-tail individuals. Increases in prenatal mortality as parity advanced were accountable for a deficiency of 2 percent. Attention is called to the wide variety of organs affected.

Comparison of Rhode Island Reds, White Wyandottes, Light Sussex, and crosses among them to produce F_1 and three-way cross pregeny, C. W. KNOX, J. P. QUINN, and A. B. GODFREY. (U. S. D. A.). (*Poultry Sci., 22 (1943), No. 1, pp. 83–87*).—In general the ♀ progeny of two- and three-way crosses between Rhode Island Reds and White Wyandottes were superior to standard bred progeny of these breeds in the rate of growth to 10–20 weeks of age and were somewhat earlier in maturing. Crossbreds showed no improvement over standard bred Rhode Island Reds in annual egg production, egg weights, hatchability of the eggs set, and mature body weights. No improvement resulted from three-way crosses. The average egg production, egg weights, hatching records, and body weights at 10 and 20 weeks of age of about 150–200 pullets of each of the breeds and crossbreds were tabulated for each of the years from 1933 to 1937. The pullets in the two- and three-way crosses matured earlier and had better viability than standard breeds. The dominance of broodiness undoubtedly reduced egg production in the crossbreds. The three-way crosses were made only in the 1934–35 and 1935–36 periods.

Genetics of egg shape, D. R. Marble. (Pa. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 1, pp. 61–71, illus. 4*).—The shape of eggs produced by individual birds was unusually uniform. It was easily possible to establish distinct egg shape lines in 1937 by selection of the dams and daughters, with the egg shape of the sires ascertained by records of their full sisters. In 3 years' additional selection, there was little improvement in egg shape. The failure to attain a high degree of variability in the F_2 population suggested that a limited number of genes control egg shape, but the absence of distinct bimodal or trimodal frequency in the backcross and F_2 progeny makes a single gene control questionable. Special study of factors influencing egg shape showed that the first egg of a clutch and the first egg laid after a pause of 7 or more days was significantly longer and narrower than average. Egg shape was not influenced by season of laying or egg size when data on 27 double-yolked eggs were omitted. The study was based on ratios of the length to width measurements of eggs produced during the last 10 days of each month by 327 unselected Barred Plymouth Rock hens and their progeny in F_1, F_2, and backcross lines selected for round and long eggs.

The development of dominant rumplessness in chick embryos, E. Zwilling. ([Conn.] Storrs Expt. Sta.). (*Genetics, 27 (1942), No. 6, pp. 641–656, illus. 7*).—A study of the embryological development of dominant rumpless embryos of 4 and 5 days' incubation and dominant rumpless chicks (E. S. R., 77, p. 319) showed that tail reduction was completed at the end of the fourth day of development. Variations in the amount of tail reduction were thought to account for different types of rumplessness. Degeneration of the presumptive tail tissue was initiated toward the close of the second day and was most pronounced during the third day of development. As the tail of 3-day embryos was not very long, no difference was found between *Rp* and normals at this stage.

Physiology of development of the feather.—VI, The production and analysis of feather-chimaerae in fowl, F. R. Lillie and H. Wang (*Physiol. Zool., 16 (1943), No. 1, pp. 1–21, illus. 13*).—Continuing the studies on the physiology of feather development (E. S. R., 85, p. 467), there were brought together in autoplastic combinations the dorsal halves of breast and saddle papillae of regenerating feathers of Brown Leghorn capons, so that feather chimeras exhibiting characters of both tracts developed. These were succeeded in successive feather generations by similar chimeras. Both self-expression and reciprocal interaction of the components were exhibited. "The analysis of feather chimeras fits very neatly into the framework of the mechanism of development as hitherto presented."

The influence of different amounts of illumination upon the body weight of birds, W. F. Lamoreux. (Cornell Univ.). (*Ecology, 24 (1943), No. 1, pp. 79–84, illus. 3*).—In three experiments White Leghorn males held in cages with feed available at all times gained weight more rapidly when exposed to 9 hr. or less of light per day than when exposed to 12 hr. or more. Long daily periods of light were not favorable to gains in body weight as in the case of reproduction. It appears that the normal changes in the length of day are contributing causes of seasonal variations in weight among wild birds.

Ascorbic acid-gonadotropic hormone relationships in the chick, F. N. Andrews and R. E. Erb. (Ind. Expt. Sta.). (*Endocrinology, 32 (1943), No. 2, pp. 140–144*).—In 4 experiments with nearly 100 chicks each, 5 or 10 daily injections of ascorbic acid alone or with pregnant mare serum had no noticeable influence on the testes weight of the chicks. No apparent relationship was found between the blood plasma ascorbic acid and the testes weight. In the studies, daily doses of from 0 to 75 mg. of ascorbic acid with and without 10 rat units of pregnant mare serum were administered to chicks from 1 to 29 days of age.

Genetic segregation of antigens.—III, Pictorial representation of the antigens of the blood corpuscles of two dove species and their hybrid, and the segregation of species-specific substances in backcross generations, R. W. CUMLEY and M. R. IRWIN. (Wis. Expt. Sta.). (*Jour. Hered., 33 (1942), No. 10, pp. 357–365, illus. 6*).—The individualities of three separate antigens in the blood corpuscles specific to the Pearlneck dove species, and not found in ringdoves, was established by segregation in backcrosses and F_1s between the ringdoves and Pearlneck. These antigens were designated as *d*–1, *d*–2, and *d*–3. The method of illustrating the reactions previously noted (E. S. R., 86, p. 614) was employed.

Polydactyly, a sub-lethal character in the pigeon, W. F. HOLLANDER and W. M. LEVI (*Jour. Hered., 33 (1942), No. 11, pp. 385–391, illus. 7*).—A polydactyl syndrome which proved to be sublethal occurred in 25 specimens in a family of Silver King pigeons. None survived beyond an early age. Breeding studies indicated the condition to be due to a recessive factor symbolized as *py*. Among the defects observed, the plumage, beak, and respiration were abnormal. A similar condition in an unrelated family was not allelic.

The nature of the red, yellow, and orange pigments in woodpeckers of the genus Colaptes, F. H. TEST (*Calif. Univ. Pubs. Zool., 46 (1942), No. 6, pp. 371–389+, illus. 11*).—Absorption curves of the pigments making the red, orange, and yellow colors, after extraction of the feathers of flickers—*C. auratus*, *C. cafer*, and hybrids between them—showed the presence of mixtures of carotenoid pigments belonging to three classes—xanthophylls, carotenes, and red carotenoids. Hybrids possessed the types found in both parental species. Extracts of the feathers were prepared with methanol, water, and petroleum ether and analyzed by absorption spectra.

Gonadotropic activity of the pituitary gland in relation to the seasonal sexual cycle of the cottontail rabbit (Sylvilagus floridanus mearnsi), W. H. ELDER and J. C. FINERTY. (Univ. Wis.). (*Anat. Rec., 85 (1943), No. 1, pp. 1–16, illus. 4*).—The weights of the sex glands and the gonadotropic hormone content of the pituitaries of male and female cottontail rabbits killed during each month of the year showed a high level of gonadotropic activity of the male pituitary from March to August. This was associated with an increase in the percentage of basophilic cells and greater weights of the sex glands. There was a decline as the reproductive system regressed. Ovarian weight increased during the breeding season, but there was no corresponding increase in the gonadotropic potency of the pituitary or percentage of basophilic cells. Corresponding with the duration of spermatogenesis, the breeding season of the female was found to last from mid-March to mid-August.

Beginning of function in the thyroid of the fetal rat, A. GORBMAN and H. M. EVANS. (Univ. Calif. et al.). (*Endocrinology, 32 (1943), No. 1, pp. 113–115, illus. 2*).—Functional accumulation of iodine was found in the thyroids of 29 18- to 19-day-old rat fetuses, with a considerable storage of iodine in 21-day-old fetuses, when the dams were given subcutaneously 1 cc. of physiological salt solution containing less than 0.01 mg. of iodine. The pregnant females were killed 48 hr. after injection. Younger fetuses showed no iodine accumulation. Ability to store iodine seemed to begin with the first differentiation of follicles with lumina in the thyroid.

Effect of pregnancy and lactation upon the thyrotropic hormone of the rabbit, A. J. BERGMAN and C. W. TURNER. (Mo. Expt. Sta.). (*Endocrinology, 32 (1943), No. 1, pp. 59–63*).—There was a slight tendency for the thyrotropin of the anterior pituitaries to increase with a greater weight of the pituitaries of New Zealand White rabbits during the first 10 days of lactation (E. S. R., 86, p. 670). No increase in the concentration per gram of pituitary tissue was noted.

It appeared from study of the pituitaries of 26 normal, 24 pregnant, and 72 lactating rabbits that pregnancy had no effect and lactation only a slight effect on thyroid weight. The removal of the young indicated that nursing had no influence on thyrotropic hormone production. Studies were made of the pituitaries of normal rabbits 10, 20, and 28 days' pregnant and at 2, 5, 10, 20, and 30 days after parturition.

Technique for thyroidectomy in the pigeon and the early effect of thyroid removal on heat production, H. N. Marvin and G. C. Smith (*Endocrinology, 32 (1943), No. 1, pp. 87–91, illus. 6*).—The technic for removal of the thyroid in the pigeon from the left side first and 4 days later the right thyroid is described, including a study of the effect on heat production. The basal heat production was depressed to —10 at 4 to 5 days after the removal of one thyroid and to —20 from 6 to 8 days after the removal of both glands in three groups of six to eight birds each.

Inactivation of testosterone propionate in the liver during vitamin B complex deficiency: Alteration of the estrogen-androgen equilibrium, M. S. and G. R. Biskand (*Endocrinology, 32 (1943), No. 1, pp. 97–102*).—Deficiency of the vitamin B complex had no significant effect as a cause of inactivation of testosterone in the liver of male rats (E. S R, 84, p 461). These results were based on body, prostate, and seminal vesicle weights of five or six groups of from three to eight rats each of the Sherman or Long-Evans strains with and without castration and implantation in the spleen or subcutaneous injections of testosterone propionate.

Forced ovulation of normal ovarian follicles in the domestic fowl, R. M. Fraps, M. W. Olsen, and B. H. Neher. (U. S. D. A.). (*Soc. Expt. Biol. and Med. Proc., 50 (1942), No. 2, pp. 308–312*).—Continuing these investigations (E. S. R., 88, p. 751), intravenous injections of appropriate hormones without pretreatment caused premature ovulation of maturing follicles by as much as 17 hr. Premature ovulations were induced by a luteinizing preparation, Prephysin, Gonadin, and Anteron. The preovulatory response was related to the maturity of the follicle and the size of the dose. It seems probable that normal ovulation is consequent on the sudden release of an appropriate hormone in the blood stream.

Time required for induction of ovulation following intravenous injection of hormone preparations in fowl, R. M. Fraps, G. M. Riley, and M. W. Olsen. (U. S. D. A.). (*Soc. Expt. Biol. and Med. Proc., 50 (1942), No. 2, pp. 313–317, illus. 1*).—Continuing the above studies, the interval between intravenous injection of suitable hormones and ovulation was from 6.1 to 7.2 hr., averaging 6.8 hr. for 14 pretreated ovulating hens with injection at different times of day. In 69 nonpretreated normal laying hens, ovulations occurred between 6.5 and 8.5 hr. after injection. There was less variation in the interval between injection and ovulation in pretreated than in nonpretreated hens, but in the former case the hens were all one breed and uniform in age whereas in the latter group the birds differed in breed, age, and dosage level. Ovulation was ascertained at autopsy in different birds at several different intervals after injection.

Rapid methods for estimating the number of spermatozoa in bull semen, G. W. Salisbury, G. H. Beck, I. Elliott, and E. L. Willett. (Cornell Univ.). (*Jour. Dairy Sci., 26 (1943), No. 1, pp. 69–78, illus. 1*).—Estimates of the number of spermatozoa in bull semen were made by counts with the hemocytometer, the photoelectric colorimeter, and the visual comparison with opacity standards prepared with standard-sized tubes and uniform dilutions. Visual comparisons of diluted semen were only slightly less accurate for estimating the number of spermatozoa, although much more rapid than the other two methods.

The effect of Amphyl on motility and longevity of bovine spermatozoa, H. O. Dunn, O. L. Lepard, J. M. Murphy, and O. F. Garrett. (N. J. Expt. Stas.). (*Jour. Dairy Sci., 25 (1942), No. 12, pp. 1015–1021*).—In seven trials the residues of Amphyl left on artificial insemination equipment and glassware had no harmful effect on the motility or longevity of sperm of semen brought in contact with the equipment. Additions of 1 cc. of a 1-percent solution of undiluted semen showed that all motility ceased within 30 sec., or within 1 hr., when diluted with equal parts of semen and phosphate buffer. However, motility persisted for several days when a small quantity of concentrated Amphyl was added to the diluted semen. Motility was maintained longer in phosphate diluter containing from 0.2 to 0.5 percent of Amphyl than in controls without Amphyl. Within about 5–8 days motility ceased in the controls or after 3 days with Lysol, but it was extended to about 15 days with the Amphyl. Hemolytic staphylococci were completely destroyed with 1 percent Amphyl in egg yolk solution or in phosphate buffer, but they continued to grow for 7 days in egg yolk-phosphate buffer containing 1 percent Amphyl.

The effect of various diluters, cooling rate, temperature of storage, and some other factors, on the livability of spermatozoa in stored samples of bull semen, E. L. Willett and G. W. Salisbury ([New York] Cornell Sta. *Mem. 249 (1942), pp. 45, illus. 5*).—Semen collected from fertile bulls of various breeds and ages in the college dairy herd was preserved most satisfactorily, and the viability was maintained longest in a yolk-citrate diluent (E. S. R., 86, p. 520). The semen was collected in a new type of artificial vagina and divided into 0.5-cc. samples for studies of the viability after storage with and without diluents,and stored at 5° and 10° C. There were employed in these studies several diluents, including Milovanov's SGC–2 diluter, egg-yolk-phosphate diluent, and egg-yolk-citrate diluent, with determinations of the motility of the sperm and the pH of the semen with and without mineral oil covering up to 10 days. In artificial insemination studies in a cooperative breeding association, with semen samples from five bulls preserved in the phosphate and citrate diluents, both required about 1.5 services per conception.

Although Gillis, Heuser, and Norris (E. S. R., 87, p. 409) found pantothenic acid needed for reproduction in hens, sperm stored in diluents with yolks from the hens on pantothenic acid-deficient rations showed no significant differences in motility, but the pH was lower. Storage of semen at 1° involved cooling at the rate of 5° per 2. hr. of storage, at 5° with cooling at the rate of 5° per 20 min. Motility was better maintained in semen stored at 5° under mineral oil than other combinations of conditions. Variation in pH from 5 to 7 with warming rates to as rapid as 30° in 1 min. showed no significant differences in the viability of the sperm. There were no marked differences in the buffer capacity of the samples, even though they varied widely in other characteristics. Fresh bull semen was highly buffered in the regions of pH 4.0 to 5.0 and 9.5 to 10.0, but poorly buffered from pH 7.0 to 9.0.

The total buffer capacity of the semen of man, bull, stallion, and dog decreased in that order. This difference was explained by variations in the proportion of accessory gland secretions in the semen of these species.

Influence of diluters, rate of cooling, and storage temperatures on survival of bull sperm, G. T. Easley, D. T. Mayer, and R. Bogart. (Mo. Expt. Sta.). (*Amer Jour. Vet. Res., 3 (1942), No. 9, pp. 358–363, illus. 1*).—Although several diluters of bull semen were employed, the only one capable of prolonging sperm survival beyond that of undiluted semen was the phosphate buffer, of which 23.5 percent survived 72 hr., and the yolk phosphate buffer, of which 69.6 percent survived 72 hr. in storage at 5° C., as noted by Phillips and Lardy

(E. S. R., 86, p. 768). The glucose-phosphorus-calcium diluter was definitely harmful. Slower rates of cooling, involving 5° steps, gave no satisfactory results.

The end of baking soda sex control—? R. COOK (*Jour. Hered.*, *33* (*1942*), *No. 12, pp. 428, 449–450*).—A review is given of the acid-alkali sex control problem, with the conclusion that sex was controlled by Gowen and Nelson (E. S. R., 88, p. 612) in *Drosophila*, but that there is as yet no applicability to rats, rabbits, and man.

Experimental attempts to modify the sex ratio in rabbits and pigs, H. C. MCPHEE and O. N. EATON. (U. S. D. A.). (*Jour. Hered.*, *33* (*1942*), *No. 12, pp. 429–433*).—In experiments in which 2,383 rabbits were born to does douched with a sodium bicarbonate or lactic acid solution before mating, there were no significant modifications in the sex ratios which could be attributed to the treatment. In experiments with swine bred by artificial insemination, the pH of the semen was altered by mixing with 3-percent lactic acid or N/10 sodium hydroxide solution without significant effect on the sex ratio of 219 pigs born in 11 fall litters in 1941 and 13 spring litters in 1942. The pH of normal semen was 7.25, but when it was lowered to 5.79 there were 45.2 percent males and when the pH was raised to 8.65 there were 47.9 percent male pigs among 219 produced.

Fertility and sex ratios in the rabbit from semen treated in vitro with lactic acid and sodium bicarbonate, L. E. CASIDA and R. L. MURPHREE. (Wis. Expt. Sta.). (*Jour. Hered.*, *33* (*1942*), *No. 12, pp. 434–438*).—No significant disturbances in the sex ratios of rabbits were induced by treating the semen used in artificial insemination with 5 percent sodium bicarbonate or with 0.25 to 1 percent lactic acid solutions. Normal fertility occurred with sodium bicarbonate treatment, but fertility was lowered greatly with lactic acid treatment. In experiments with lactic acid-treated sperm 19 does were inseminated, producing 24 young. When the semen was treated with sodium bicarbonate 31 does produced 164 young, and approximate equality of the sexes was noted. Similar results occurred when insemination was delayed after mating with a sterile buck to induce ovulation.

Augmentation of the pregnant mare serum gonadotropic effect, H. JENSEN, J. D. HAUSCHILD, and J. S. EVANS (*Soc. Expt. Biol. and Med. Proc.*, *50* (*1942*), *No. 2, pp. 356–358*).—The increase in the ovarian weights of immature rats showed augmentative action of a follicle-stimulating hormone of the anterior pituitary on the gonadotropic activity of pregnant mare serum. At the same time chorionic gonadotropin showed no augmenting effect on the pregnant mare serum preparation. The specific nature of the pituitary hormone for augmentation of pregnant mare serum is indicated.

Observational and experimental evidences relating to the origin and differentiation of the definitive germ cells in mice, N. B. EVERETT (*Jour. Expt. Zool.*, *92* (*1943*), *No. 1, pp. 49–91, illus. 33*).—In further studies of ova formation (E. S. R., 87, p. 658), the author concludes that the sex cells which are set aside in early development are the only ones that form ova. In morphological studies of early embryos primordial sex cells were found in the gut entoderm which migrates into the genital ridge. In transplantation of the genital ridge to adult host kidneys there were formed typical testicular and ovarian tissues but no sex cells unless primordial sex cells were available. Transplantation experiments were made in *Peromyscus* and albino mice. In further studies the germinal tissue of the ovary was destroyed by X-rays, and no evidence of newly formed germinal tissue was observed in 35 mice ranging from 3 to 188 days after irradiation. Growth of secondary reproductive tissues was noted.

Ovulation, maturation, and fertilization in the fox, O. P. PEARSON and R. K. ENDERS (*Anat. Rec.*, *85* (*1943*), *No. 1, pp. 69–83, illus. 15*).—Histological study and microphotographs are presented and described for fertilized embryos, germ cells, and germinal tissues of 33 female foxes killed at different intervals following ovulation and mating. Ovulation usually occurred late on the first day or early on the second day of receptivity. Fertilization occurred in the middle portion of the oviduct, about 1 day or more after ovulation.

Shortening gestation by inducing early implantation with increased light in the marten, R. K. Enders and O. P. Pearson (*Amer. Fur Breeder, 15 (1943), No. 7, p. 18, illus. 1*).—The gestation period of martens was shortened by increasing the length of day with artificial light, beginning in September. The treatment appeared to induce early implantation, which also favored the number of blastocysts implanted.

Sperm studies as a guide in fur-animal breeding practice, R. K. Enders (*Amer. Fur Breeder, 15 (1943), No. 7, pp. 20–21*).—Methods for examining semen withdrawn from the vagina of female mink and vixen for viability of sperm are described. A number of missed matings and sterility in males may be detected.

A new agar medium for Drosophila culture, M. T. Lewis. (Pa. Expt. Sta.). (*Science, 96 (1942), No. 2490, p. 282*).

FIELD CROPS

[Farm crops research in Mississippi] (*Miss. Farm Res. [Mississippi Sta.], 6 (1943), No. 2, pp. 1, 2, 7, 8*).—Progress results from agronomic experimentation are reported in articles entitled Varieties of Grade A Cotton, Yielding 1⅛-Inch Staple in Delta Tests, Listed (p. 1), by C. Dorman; Yields of Cotton Varieties in Tests by Hill Stations, by J. F. O'Kelly (p. 2); Ogden, Volstate, Arksoy Group Lead in Hill Tests of Grain Soybean Varieties, by J. F. O'Kelly and E. B. Ferris (p. 7); and Nitrogen Fertilizer Profitably Applied as Oats Top-Dress, by R. Coleman (p. 8).

[Crop improvement research] (*Farm and Home Sci. [Utah Sta.], 4 (1943), No. 1, pp. 3, 4, 5, 12–14, illus. 5*).—Methods and accomplishments are discussed in articles entitled Disease-Free Foundation Potato Seed Stock To Be Produced at the Experiment Station, by B. L. Richards (pp. 3, 4); The Story of Hybrid Corn, by B. H. Crandall and R. W. Woodward (pp. 5, 12); and Progress With Curly-Top-Resistant Varieties of Sugar Beets, by F. V. Owen and A. Murphy (pp. 13–14).

Growing more feed, G. H. Ahlgren (*New Jersey Stas. Cir. 453 (1943), pp. 8*).—Cultural and fertilizer practices and rotations are outlined for feed crops in New Jersey. Varieties and seeding rates, depths, and dates are recommended for corn, wheat, oats, barley, rye, soybeans, alfalfa, red clover, vetch, crimson clover, ryegrass, sorgo, and Sudan grass.

The isolation of isogenic lines as a means of measuring the effects of awns and other characters in small grains, I. M. Atkins and P. C. Mangelsdorf. (U. S. D. A. coop. Tex. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 7, pp. 667–668*).—Procedure is described.

Some observations on the tolerance of salinity by cereal crops in Saskatchewan, J. B. Marshall (*Sci. Agr., 22 (1942), No. 8, pp. 492–502*).—Common cereals can be grown on land fairly high in soluble salt content, according to salt concentrations found in cultivated fields and behavior of wheat, oats, and barley varieties on plats of saline soil. Oats, and even wheat, survived 1.00 percent of Na and Mg sulfates, while barley was growing with 1.62 percent of salts in the surface soil. The most noticeable effects on barley and oats were delay in ripening and somewhat thinner stand.

Survival of barley and wheat varieties in mixtures, C. A. Suneson and G. A. Wiebe. (U. S. D. A. coop. Calif. Expt. Sta.). (*Jour. Amer. Soc. Agron.,* *34 (1942), No. 11, pp. 1052–1056*).—Progressive changes in composition of mixtures of four barleys (1933–41) and five barleys (1937–41) and of five wheats (1937–41) showed that relative yield of a variety is not necessarily a criterion of ability to survive in competition. The high-yielding and rather widely adapted Vaughn barley and Ramona wheat were poor competitors in mixtures with other varieties having slightly lower individual yields. A decided limitation for success of the bulked population method of breeding when populations are carried into advanced generations was suggested. See also an earlier note by Harlan and Martini (E. S. R., 80, p. 39).

Germination and emergence of some native grasses in relation to litter cover and soil moisture, G. E. GLENDENING. (U. S. D. A.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 9, pp. 797–804*).—Germination and emergence of seedlings of 10 native perennial grasses on a depleted semidesert grassland range south of Tucson, Ariz., was increased from 4 to more than 20 times over that on the bare ground by various surface-soil treatments, including cultivation and litter covers. Moisture content at all levels (surface-inch, 6–, and 12–in. depths) was consistently greater under the straw and gauze than on bare ground, and the moisture content of surface soil was above the calculated wilting coefficient a longer time under the straw litter.

Differences in sugar content of grass associated with soil fertility, growth conditions, and growth habit, A. O. KUHN and W. B. KEMP. (Md. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 7, pp. 672–674*).—Sugar contents of vegetative and seed types of red fescue tended to increase with higher soil fertility. The vegetative type accumulated more sugar even in spaced planting. Forces checking seed production in solid plantings were not associated with deficiency of accumulated sugars, nor were water supply and sugar content consistently associated.

Changes in the proportion and yield of alfalfa and Korean lespedeza in mixtures with grasses, D. W. MAYS, JR. (*Jour. Amer. Soc. Agron., 34 (1942), No. 9, pp. 856–859*).—Korean lespedeza was replaced by Johnson grass in a lespedeza-Johnson grass mixture and by Bermuda grass in a lespedeza-Bermuda grass mixture in experiments on Ruston sandy loam at Pine Bluff, Ark., 1935–37. Korean lespedeza and Dallis grass appeared to reach an edaphic climax in a lespedeza-Dallis grass mixture, yielding 50 percent of each. Alfalfa was replaced by Johnson grass in an alfalfa-Johnson grass mixture, 1935–38, on Trinity clay. Acre yields of the legumes alone and in mixtures are tabulated.

A comparison of carotene, protein, calcium, and phosphorus content of buffalo grass, Buchloe dactyloides, and blue grama, Bouteloua gracilis, W. LANGHAM, W. N. MCMILLEN, and L. WALKER (*Jour. Amer. Soc. Agron., 35 (1943), No. 1, pp. 35–42*).—From May 1939 to November 1941, at Goodwell, Okla., moisture, crude protein, carotene, and P were high in both grasses during early stages but decreased rapidly as plants matured, while Ca was quite variable throughout the growing season. Averages of analyses of all samples taken after frost showed buffalo grass to be much the higher in crude protein, crude ash, Ca, and P, indicating that it makes better winter pasture and suffers less loss of nutrients due to wintering or leaching than does blue grama. Previous clipping seemed to affect the chemical composition of buffalo grass less than that of blue grama.

The germination and early seedling development of twelve range grasses, A. P. PLUMMER. (U. S. D. A.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 1, pp. 19–34, illus. 2*).—Germination in alternating temperatures of 30° C. for 6 hr. and 20° 18 hr. was usually as satisfactory as at constant 30°, room temperature between 19° and 23°, or a mean greenhouse temperature of 14°, fluctuating between

10° and 40°. For most rapid and uniform emergence of shoots, ¼ in. was the most desirable depth to plant in the greenhouse. Total root development prior to summer drought appeared to be directly associated with initial success or failure.

Seeding native grasses, H. W. STATEN (*Oklahoma Sta. Cir. 108 (1943), pp. 11, illus. 4*).—Native grasses have been sown successfully by scattering native grass hay over the land and by drilling good adapted native seed in a sorghum stubble mulch either with the Woodward-type drill or a converted grain drill. The methods are outlined, with directions for converting the grain drill.

Establishing and improving permanent pastures in North Carolina, W. W. WOODHOUSE, JR., and R. L. LOVVORN (*North Carolina Sta. Bul. 338 (1942), pp. 24, illus. 10*).—Reporting progress from the pasture research program, the publication treats of lime and fertilizers and their application, pasture legumes and grasses, and seeding and management practices. Findings of practical value include need of Ca, P, and K for satisfactory growth of legumes, essential for good pastures; improvement of poor soils with Ca, P, and K and lespedeza before sowing grasses; a shallow, firm seedbed; merits of vegetative mulches in preventing drying and crusting of seedbeds on eroded clay soils; Dallis, Bermuda, and orchard grasses, Kentucky bluegrass, lespedeza, and white clover the best adapted pasture plants; need for control of weeds and brush; and avoidance of overgrazing by use of supplemental pastures.

Adaptation of various crops for supplementary pasture, T. E. ODLAND, T. R. COX, and C. H. MORAN. (R. I. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 3, pp. 229–237, illus. 1*).—Winter rye, winter wheat, spring oats, Sudan grass, and Japanese millet grown from several dates of seeding. 1938–41, were all found suitable for supplementary pasture. Considering both fall and spring grazing, rye and wheat were better when sown September 1 and 10. Rye produced more spring pasturage than wheat. Oats planted May 5 provided grazing when most needed, whereas with earlier seedings the grazing stage coincided more nearly with the flush season on permanent pastures. Millet and Sudan grass seeded from June 1 to July 1 produced grazing at a critical period, while earlier plantings, particularly of Sudan grass, were less successful. No toxic amounts of HCN were found in any Sudan grass sample. Analyses showed all materials to be satisfactory in feeding value. A system of supplementary pasture management is suggested.

A comparison of line transects and permanent quadrats in evaluating composition and density of pasture vegetation of the tall prairie grass type, K. L. ANDERSON. (Kans. Expt. Sta. coop. U. S. D. A.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 9, pp. 805–822, illus. 5*).—Comparisons in native tall grass pastures near Manhattan, Kans., in 1940 showed the two methods to give comparable results in general. The line-transect method was much faster and cheaper and had other advantages over the quadrat method.

A study of the inclined point quadrat method of botanical analysis of pasture mixtures, A. C. ARNY and A. R. SCHMID. (Minn. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 3, pp. 238–247*).—A method of correcting for overemphasis of Kentucky bluegrass alone and Kentucky bluegrass and crested wheatgrass together, and for underemphasis of alfalfa, from readings from the point quadrat apparatus in pasture mixtures was derived. Percentages of these species determined from the corrected readings from the apparatus usually approached rather closely percentages determined from dry weights.

Effects of pasture practices on root distribution, J. L. HAYNES. (U. S. D. A. and N. J. Expt. Stas.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 1, pp. 10–18*).—In bluegrass pasture on Dutchess loam near Sussex, N. J., variously fertilized and subjected to rotational or continuous grazing, increase of roots near the surface and decrease below 2 in. was associated with surface fertility application. Root growth was correlated positively with K at low K concentrations and with P at high P concentrations. Effects upon root growth indicated that continuous moderate grazing of N-fertilized pastures did not prevent carbohydrate storage during the summer grazing season. An increase in root concentration near the soil surface is deemed significant in relation to control of erosion.

Irrigated pastures in California, B. J. Jones and J. B. Brown (*Calif. Agr. Col. Ext. Cir. 125 (1942), pp. 47, illus. 11*).—Practical information on seed mixtures, legumes and grasses, land preparation and irrigation methods, costs, management, and improvement practices, and control of livestock parasites on irrigated pastures.

Pastures and pasture research: Six lectures delivered at The University of Sydney, 1941, C. M. Donald (*[Sydney, N. S. W.]: Univ. Sydney, 1941, pp. 108, illus. 40*).—The six lectures are entitled The Role of Pastures in Land Use Planning, Pasture Competition and Seeds Mixtures, Species and Strains of Pasture Plants, Pasture Management, The Nutritive Value of Pastures, and The Technique of Pasture Experimentation. References to literature total 147.

A device for sampling baled hay, A. D. Pratt. (Va. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 12, p. 1139*).—Sampling by the Pozzo soil tube designed by Veihmeyer (E. S. R., 61, p. 503) was very satisfactory.

Insure legumes with inoculation, H. W. Batchelor (*Ohio Sta. Spec. Cir. 67 (1943), pp. 10*).—Questions are answered on reasons for and benefits from inoculation of legumes, cross-inoculation groups, and inoculation cultures, their production and use, and how they are affected by environmental and cultural factors.

Application of borax produces seed set in alfalfa, J. R. Piland and C. F. Ireland. (N. C. Expt. Sta. et al.). (*Jour. Amer. Soc. Agron., 33 (1941), No. 10, pp. 938–939, illus. 1*).—Alfalfa on Cecil fine sandy loam low in B showed severe B deficiency but responded to a winter application of 20 lb. of borax per acre with a good seed set and no symptoms. Many soils in North Carolina showed low B content, most of them from 0.1 to 0.3 p. p. m. of available B. Practical applications are suggested.

A new variety of barley—Tregal, T. E. Stoa (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 3, pp. 25–26*).—Tregal barley, carried forward by L. R. Waldron from a cross between Trebi and Regal made by G. N. Geiszler, has partly smooth awns, resembles Trebi in high yield, similar maturity, and relatively short straw, but differs therefrom in having nearly smooth awns, slightly stronger straw, and a shorter and smaller white kernel. In percentage extract of malt it compares favorably with other varieties and in diastatic power is about equal to Wis. 38 (Wisconsin Barbless) but definitely below Manchuria. Pending more information, Tregal should be regarded primarily as a productive, smooth-awned feed barley to replace Trebi and other rough-awned feed barleys.

Winter barley in North Carolina, G. K. Middleton, W. H. Chapman, R. W. McMillen, J. W. Hendricks, and D. W. Colvard. (Partly coop. U. S. D. A. et al.). (*North Carolina Sta. Bul. 336 (1942), pp. 19, illus. 6*).—Yield trials of barley strains in the Piedmont at Statesville, 1932–42, and for shorter periods in the mountains and Coastal Plain are reported, with descriptions of four new varieties developed in breeding work and distributed and brief statements on cultural, grazing, and harvesting practices found desirable.

Awned barleys, as a type, produced significantly higher yields of grain than did hooded barleys, based upon averages over the period. Iredell, a hooded variety, matures about 1 week earlier than Tennessee Beardless No. 6, tends to lodge on very fertile soils, and should be limited largely to the Coastal Plain or for forage in the Piedmont. Randolph, a semispring, awned barley, the earliest variety grown in the State, makes an extremely rapid growth when sown in the late summer and is one of the best to seed early for fall grazing but has a weak straw. Davidson, a true winter, awned variety, has a stiff straw, has produced more grain than any other variety in tests at Statesville, and matures about the same time as Iredell. Sunrise, a practically awnless type, only 5 yr. in the tests, yielded the most grain of any variety in the Coastal Plain and Piedmont tests and was second in the mountains. In inoculation tests, Iredell and Davidson and several other selections showed good resistance to the floral-infecting loose smut (*Ustilago nuda*) and also to a number of physiologic races of covered (*U. hordei*) and black loose smut (*U. nigra*). Sunrise has been resistant to mildew but very susceptible to *U. nuda*.

Floret and seed types in Kentucky bluegrass in relation to yield and quality of seed, J. T. SPENCER and E. N. FERGUS. (Ky. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 11, pp. 1035–1041, illus. 2*).—Examination of samples of the 1941 seed crop of Kentucky bluegrass in the central bluegrass region disclosed that 46 percent of the florets contained ovaries which made no development toward production of a seed, 72 percent of the florets failed to yield a completely developed seed, and 22.5 percent of the florets produced seeds with hard endosperm, 4.3 percent seeds with wholly soft endosperm, and 1.4 percent seeds whose endosperms were both soft and hard. Individual plant selections ranged in hard seed production from 0 to 32 percent in 1941 and from 7 to 76 percent in 1940. Relationship between seed development and market quality is discussed.

The inhibiting effect of dead roots on the growth of bromegrass, H. M. BENEDICT. (U. S. D. A.). (*Jour. Amer. Soc. Agron., 33 (1941), No. 12, pp. 1108–1109*).—That accumulation in the soil of growth-inhibiting substances derived from the dead roots of bromegrass might be partly responsible for sod-binding of bromegrass was suggested in a preliminary experiment at Cheyenne, Wyo.

Bromegrass toxicity vs. nitrogen starvation, H. E. MYERS and K. L. ANDERSON. (Kans. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 8, pp. 770–773, illus. 2*).—The authors hold that factors responsible for sod-bound conditions in bromegrass, according to effects of bromegrass sod with and without N fertilizer on the yield of grasses, should be sought in deficiencies in soil fertility rather than in a toxic condition. Any detrimental effects of previous bromegrass on subsequent grass production was more than overcome by 200 lb. of ammonium sulfate per acre.

Deterioration of bur clover seed under irrigated conditions, R. P. BARTHOLOMEW, L. C. CARTER, and J. E. CASEY. (Ark. Expt. Sta. et al.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 1, pp. 104–106*).—Seed of bur-clover, especially hulled seed, remaining in the soil under water-logged conditions as encountered in rice production deteriorated rapidly. Since the volunteering characteristic of the plant evidently is not adapted to rice farming conditions, bur-clover for a cover crop would have to be sown every year.

Crimson clover in the Coastal Plain of the Southeast, J. L. STEPHENS and E. A. HOLLOWELL. (U. S. D. A. coop. Ga. Coastal Plains Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 11, pp. 1057–1059, illus. 1*).—Seed source, as hard-seeded strains that volunteer to a good stand in fall; firm seedbed, e. g., a closely clipped or grazed Bermuda sod; liberal fertilization for establishment of stands; and effective inoculation are requirements and practices derived from tests on Tifton sandy loam. A combination of crimson clover and the new hay type Bermuda grass has given four cuttings of hay per season (one clover and three grass cuttings), totaling from 3 to 4 tons of hay per acre.

The influence of clipping treatment and rolling on the yield of clover seed, C. R. Megee, M. G. Frakes, and I. T. Larsen. (Mich. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 9, pp. 841–843*).—Clipping did not increase mammoth clover seed production, although it could reduce excessive plant growth and facilitate harvesting. Early clipping did not reduce seed production appreciably, but late clipping is hazardous and advantages with respect to ease of harvest may be gained by rolling just before bloom. Late rolling may cause loss of the seed crop. Cutting the first crop of medium red clover for hay in early bloom, before any heads turned brown, gave a higher and more consistent yield of seed. Alsike clover seed yields were decidedly decreased by clipping. Results in Ohio have been noted (E. S. R., 71, p. 313).

Persian clover, E. A. Hollowell (*U. S. Dept. Agr., Farmers' Bul. 1929 (1943), pp. 10+, illus. 7*).—Persian clover (*Trifolium resupinatum*), a true winter annual adapted to low-lying heavy soils of the Southern States, produces nutritious forage in late winter and early spring relished by livestock and poultry. Its advantages, cultural and fertility needs, and uses for pasture, hay, green manure, cover crop, and seed production are described.

The evaluation of individual plants of white clover for yielding ability in association with bluegrass, S. S. Atwood and R. J. Garber. (U. S. D. A. et al.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 1, pp. 1–6, illus. 1*).—Marked differences were noted in ability of 64 clones of white clover, increased vegetatively and planted as rooted cuttings in small field plats, to persist in competition with Kentucky bluegrass. Presence or absence of good clover was reflected clearly in the color and quantity of the associated grass. In both the high- (2-in.) and low-cut (1-in.) plats, differences between clones in total 1940 yield were highly significant. The lattice design (four replications) was more efficient than complete randomized blocks. The taller, more spreading, and more densely growing clones usually produced better sod.

The evaluation of individual plants of pasture grasses in association with white clover, W. M. Myers and R. J. Garber. (U. S. D. A. et al.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 1, pp. 7–15, illus. 5*).—Replicated plats established from 81 clones of Kentucky bluegrass planted in association with white clover were clipped periodically to simulate moderate grazing for 3 yr. A grass-clover association resembling that found under moderately heavy grazing was obtained in plats of most clones. Significant differences in total annual yield and differences in seasonal yield were found among the grass clones. The lattice design was more efficient than a randomized block design.

Relative efficiency of incomplete block designs using corn uniformity trial data, M. S. Zuber. (Iowa Expt. Sta. coop. U. S. D. A.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 1, pp. 30–47, illus. 1*).—The lattice square, balanced lattice, lattice, and triple lattice, incomplete block designs, were applied to corn uniformity trial data assuming 25, 49, 81, and 121 varieties in plats 2 by 5, 4 by 5, and 2 by 10 hills in size. The average of all designs computed with and without recovery of interblock information showed respective gains of 36 and 25 percent in favor of incomplete block designs over the randomized complete block. Of different designs studied, computed in the old method, the lattice square $\frac{k+1}{2}$ and k+1 replications showed gains in precision of 32 and 31 percent, respectively, balanced lattice 26, lattice 18, and triple lattice 17 percent. In the study of adaptation of plat size and shape to the various designs, the 2- by 5-hill plat with twice as many replications yet occupying the same area of land as the 2- by 10- and 4- by 5-hill plats was more advantageous than these arrangements, which followed in order. The 2- by 10-hill plat surpassed the 4- by 5-hill plat even in the lattice square designs. Study of the shape of an incomplete block indicated that efficiency of the design increases with more compactness of these blocks. Compactness of an incomplete block may be adjusted by movement of plats within a block or by changing the shape of the plats therein.

The 1942 Iowa corn yield test, F. Reiss, J. L. Robinson, and M. S. Zuber. (Coop. U. S. D. A. et al.). (*Iowa Sta. Bul. P51 (1943), pp. 625–680, illus. 1*).—The 317 section entries comprising 951 district entries in the 12 fields of the 1942 test were grown cooperatively and in the same groupings as heretofore (E. S. R., 87, p. 215). Yields and other agronomic data are tabulated for each entry, results over periods of years are reviewed, and test conditions and methods and the season are described. The average acre yield for all fields was the highest on record, while the average stand was the lowest since 1938. Lodging averaged 8.2 and dropped ears 0.2 percent compared with 17.2 and 1.4 percent, the respective 8-yr. averages. Yield differences between highest- and lowest-yielding regular hybrids when compared in the same section resembled those in previous years, and showed that not all hybrids are outstanding in ability to yield. There was evidence that not all new hybrids equal or surpass the better hybrids currently in commercial production.

The highest-performing section entries with scores in regular hybrid and experimental hybrid classes, respectively, were for the northern section Comp Iowa Hybrid 4316, Allee Hybrid 194; north-central section Iowa Hybrid 3553, Iowa Hybrid 3553; south-central section U. S. Hybrid 13, 2489×2490; and for the southern section Comp. Ohio Hybrid C92, Iowa Hybrid 4060. Composite Iowa Hybrid 4316 was the regular section entry with the highest performance score.

Ohio corn performance tests and recommendations, 1942, G. H. Stringfield, R. D. Lewis, and H. L. Pfaff. (Coop. U. S. D. A., Ohio State Univ., et al.). (*Ohio Sta. Spec. Cir. 66 (1943), pp. 37, illus. 10*).—Performance data, including acre yields, dry matter in ears at harvest, days from planting to silking, and lodged and broken plants, are reported again (E. S. R., 87, p. 369) for corn hybrids and open-pollinated varieties harvested from 28 tests in 27 counties in 1942. Hybrids recommended for grain production are listed for each of the 7 adaptation areas in the State. For silage the suggestion is that growers use a high-yielding grain hybrid maturing 1–2 weeks later than hybrids recommended for grain.

Parental corn inbreds: Hand pollination methods and cost studies, J. W. Thayer, Jr., and E. E. Down. (Mich. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 8, pp. 720–724*).—Yield data and time and cost records were kept in 1941 for production by hand-pollination of seed for 21 parental corn inbreds. Attempted pollinations acceptable for seed averaged 67.6 percent for all strains and ranged from 83.3 to 34.3 for individual strains. For 10.037 attempted pollinations, average yield per pollination per strain ranged from 44 to 298 seeds, and for all strains averaged 146.5 seeds. The average pollination required 3.92 min. of man labor in the field and harvesting, sorting, and shelling an additional 0.71 min. With labor at 45 ct. per hour, cost per pollination, including materials, approximated 4 ct. Cost of producing parental inbred seed corn varied between strains from 91.0 to 13.6 ct. per 1,000 seeds, which for 656 lb. of seed averaged 34.7 ct. Three of four strains produced more with the bottle method than with tassel-bagging; the production cost per 1,000 seeds was 21.3 ct. with bottles and 28.6 ct. with tassel-bagging.

Tests of corn hybrids and varieties at seven locations in Mississippi, 1942, W. H. Freeman, S. P. Crockett, E. B. Ferris, T. E. Ashley, T. F. Akers, and P. E. Gull. (Coop. U. S. D. A). (*Mississippi Sta. Bul. 373 (1943), pp. 15, illus. 1*).—Comparisons of corn hybrids and new varieties with Mosby, College 47, and Neal Paymaster at seven locations in Mississippi showed (for the State as a whole) that Louisiana hybrids 3802 and 468 outyielded Mosby, which was about equaled by Louisiana hybrids 389, 398A, and 123 and Tennessee 10 and 15. All other hybrids and varieties tested were significantly below Mosby in yield. Hastings Yellow Prolific was rather generally adapted to the State, for it did not yield much less than Mosby except at Stoneville. Yellow Paymaster compared favorably with the white Neal Paymaster strain but yielded less. Florida W-1, which has good husk protection, gave yields similar to Mosby in southern Mississippi but less in the other tests. From their performance, hybrids from the Corn Belt, as Missouri 8, did not appear suitable for Mississippi conditions in yield, husk protection, or lodging resistance.

Comparative studies of commercial and station corn hybrids for maturity as determined by moisture percentages at husking, R. F. Crim, C. Borgeson, H. K. Hayes, R. E. Hodgson, F. R. Immer, H. H. Kramer, and E. H Rinke (*Minnesota Sta. Bul. 367* (*1943*), *pp. 14*, *illus. 1*).—The maturity classes, variety names, average percentage of moisture, and maturity ratings in days are shown for numerous hybrids registered for sale and grown on trial plats in 1942 in comparison with certain Minhybrids in each of the five corn maturity zones (E. S. R., 86, p. 36) of the State.

Containers for corn moisture samples, J. L. Robinson and J. E. Christensen. (Iowa Expt. Sta.). (*Jour. Amer. Soc. Agron.*, *34* (*1942*), *No. 1*, *pp. 59-62*).—Metal cans and cellophane bags were found satisfactory for storing corn previous to making a moisture determination. Cardboard ice cream containers permitted escape of moisture at the rate of from 0.5 to 1.0 percent daily, depending upon the wetness of the corn, and packaging them in a carton did not change the rate of loss. The highest rate of moisture loss from each type of container was from the wettest corn.

Land management in corn production, C. A. Helm (*Missouri Sta. Cir. 251* (*1943*), *pp. 4*).—Crop rotations, fall plowing, and fertility practices are indicated for profitable corn yields.

Good practices in corn planting and cultivation, C. A. Helm (*Missouri Sta. Cir. 254* (*1943*), *pp. 4*).—Methods essential to best yields are outlined.

Germination of maize under adverse conditions, L. A. Tatum and M. S. Zuber. (Iowa Expt. Sta. coop. U. S. D. A.). (*Jour. Amer. Soc. Agron.*, *35* (*1943*), *No. 1*, *pp. 48-59*, *illus. 3*).—Inconspicuous pericarp injury over the corn germ was closely related to stand and yield in the field, its seriousness depending upon how direct an opening is provided for pathogens to reach the embryo. Percentage of the kernels with pericarp injury depended largely upon processing methods, and a low moisture content of the seed during shelling and other operations greatly increased the amount of injury. Fungicidal dust treatment did not adequately prevent poor stands in the field; more effective was the use of seed with an intact pericarp.

What effect do commercial fertilizers have on the maturity of corn? H. C. Rather and J. Tyson. (Mich. Expt. Sta.). (*Jour. Amer. Soc. Agron.*, *35* (*1943*), *No. 1*, *pp. 43-47*).—Several formulas and acre rates applied to three corn hybrids on Conover silt loam, 1939-41, had no practical influence on maturity and yield responses. Gains in yield were significant in some cases, but not highly profitable.

An association of root injury by white grubs, Phyllophaga spp., and lodging of crossbred strains of corn, L. C. Hoegemeyer. (Kans. Expt. Sta. coop. U. S. D. A.). (*Jour. Amer. Soc. Agron.*, *33* (*1941*), *No. 12*, *pp. 1100-1107*, *illus. 4*).—Among progeny of six inbred lines and all possible single and 29 of possible double-cross combinations among them, differential root injury by white grubs and lodging were detected. Combinations of certain inbred lines resulted in some superior single crosses and double crosses and others inferior in amount of root injury and in consequent lodging. Certain single crosses were injured less than double crosses involving them as parents.

Cotton variety experiments in Georgia, 1938–1942, R. P. Bledsoe and E. D. Matthews (*Georgia Sta. Cir. 140 (1943), pp. 8*).—Coker 100, Stoneville 2B, and D. and P. L. were high in money value and lint yield per acre in north Georgia tests (E. S. R., 87, p. 216), 1938–42. Results were similar in 1940 and 1942, except that Coker 200 also yielded high. Three strains of Empire, a new variety developed by the station and U. S. Department of Agriculture, cooperating, were noteworthy in 1942 tests. Empire is of the Stoneville type but has larger bolls, higher lint percentage, and is early. Its lint length approximates that of the three varietal leaders above. In south Georgia tests, 1938–42, leaders in acre value included Coker 4-in-1, Coker Clevewilt 7, and W. W. Wannamaker Cleveland Wilt Resistant. Average results in 1942 resembled those of previous tests, except that Coker Clevewilt 7 yielded relatively lower than heretofore. The most promising new strains tested in 1942 were Wannamaker Stonewilt 18 and Bobshaw 1.

Results from inbreeding upland cotton for a ten-year period, H. B. Brown. (La. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 12, pp. 1084–1089, illus. 3*).—Inbreeding for 10 yr. eight varieties of upland cotton, namely, Trice, Wannamaker Cleveland, Dixie Triumph, Triumph 406, Acala, D. and P. L. 6, Delfos 6102, and Deltatype Webber, resulted in an average reduction of 9.3 percent in production of seed cotton, 6.2 reduction in blooming rate, and 9.3 percent reduction in boll size in comparison with crossed strains. The latter also had greater vegetative growth and opened bolls earlier.

Degeneration within cotton varieties, J. F. O'Kelly. (Miss. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 9, pp. 782–796, illus. 2*).—Increase of five standard cotton varieties for an extended period, with cross-pollination prevented between varieties, was accompanied by definite rise in the proportion of seed with low lint percentages and bare seed. This change seemed largely responsible for a decrease in lint percentage as reproduction progressed and consequent increasing number of bolls needed to give a pound of lint. The increase of bare seed was faster in some varieties than in others, probably due to differences in proportion of bare seed contained in the stocks at the beginning and differences in soil moisture in the reproduction areas. Varieties of hybrid origin did not change faster than others.

Relationship of certain characteristics of seed cottons to ginning, W. S. Smith, W. J. Martin, and N. L. Pearson. (U. S. D. A. coop. Miss. Expt. Sta.). (*Jour. Agr. Res. [U. S.], 66 (1943), No. 6, pp. 249–260*).—Sixteen cotton varieties grown at Stoneville, Miss., 1936–37, differed significantly in the time (minutes) and net energy (watt-hours) required to gin either 30 lb. of seed cotton or enough seed cotton to produce 10 lb. of lint. The larger and more fuzzy-seeded cottons took longer and required more energy to gin than the smaller and less fuzzy-seeded varieties. Varieties with a high lint percentage required less time and energy to gin 10 lb. of lint than cottons with low lint percentage. While lint percentage had little effect upon the energy needed to gin 30 lb. of seed cotton, an increase in lint percentage tended to require a longer time. Strength of fiber attachment to the seed had no effect upon the energy requirement.

Methods of breeding crested wheatgrass, Agropyron cristatum (L.) Beauv., R. M. P. Murphy. (Minn. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 6, pp. 553–565*).—Variability among plants tested in individual plant nurseries and as replicated clonal progenies and effects of self-fertilization were studied in selected plants of forage and Fairway types of crested wheatgrass. Forage-type plants had a normal somatic chromosome number of 28 and Fairway type 14. Both types were highly unfruitful when self-pollinated. Most of the 1-yr. selfed plants were reduced greatly in vigor, and none set more seed than their parental plants under self-pollination conditions. Reduction in pollen size and fertility was noted in certain 1- and 2-yr. selfed plants. Tests in clonal progenies revealed differences in yield, plant height, and root rot injury (severe in July and August) among forage-type plants, and differences in yield among selected Fairway-type plants. The latter type yielded more and were shorter than forage-type plants and were resistant to root rot injury. Variations in β-carotene content among forage-type clones examined were not important.

Acid scarification of the seed of two Cuban fiber plants, C. L. Horn and J. E. Natal Colón. (P. R. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 12, pp. 1137–1138, illus. 1*).—Scarification of seed was practically complete after a 5-min. acid treatment with 96.5 percent sulfuric acid, although longer treatments improved germination. The optimum acid treatment for germination for *Urena lobata* hulled seed approximated 1 hr. and for unhulled seed 3 hr., and for unhulled *Triumfetta semitriloba* 15 min. Water-treated seeds germinated much more poorly than the acid-treated seeds or not at all. Objectionable bristles or spines of the bur fruits were practically removed after 15 min. in the acid, thus eliminating clustering of seeds or fruits and enabling plantings with a grain drill.

Hemp, B. B. Robinson (*U. S. Dept. Agr., Farmers' Bul. 1935 (1943), pp. 16, illus. 17*).—Practical information is given on the characteristics of hemp; its soil, fertility, and cultural needs; and proper harvesting, retting, and handling practices. A manual test of the end point of the ret is described and illustrated.

Hemp: An Illinois war crop, J. C. Hackleman and W. E. Domingo. (Coop. U. S. D. A.). (*Ill. Agr. Col. Ext. Cir. 547 (1943), pp. 8, illus. 6*).—Cultural and fertility requirements and harvesting, retting, and handling practices, described briefly, are based extensively on results and experience of the Kentucky and Wisconsin Stations and the U. S. Department of Agriculture.

Deficiency symptoms and chemical composition of lespedeza as related to fertilization, R. E. Blaser, G. M. Volk, and W. E. Stokes. (Fla. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 3, pp. 222–228, illus. 4*).—The Ca, P, K, and N contents of annual lespedeza, grown on a Leon fine sand typical of much of the flat pine lands of peninsular Florida and sampled during early bloom, were increased significantly by fertilization, which also stimulated growth. P- and K-deficiency symptoms, described and illustrated, were substantiated by plant analyses. Increases of P content resulting from P fertilization were accompanied by increases in N. The soil was found low in readily soluble P, Ca, and K, needed by virgin soils of this series for satisfactory lespedeza.

New varieties of oats for North Dakota, T. E. Stoa and C. M. Swallers. (Partly coop. U. S. D. A.). (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 3, pp. 17–22*).—Yields of oats varieties (E. S. R., 87, p. 55) in 1942 and average yields, 1939–42, determined in tests at several stations are tabulated, with descriptions of the merits and limitations of commonly grown and new oats, including Gopher, Marion, Boone, Vicland, and Tama (early oats), Rainbow, Vanguard, Anthony, and Rusota (midseason oats), and several other varieties.

Oat varieties for winter pasture production, I. P. Trotter. (Tex. Expt. Sta.) (*Jour. Amer. Soc. Agron., 34 (1942), No. 3, pp. 292–294*).

Survival of oats grown in winter-hardiness nurseries, 1937 to 1941, F. A. Coffman. (U. S. D. A.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 7, pp.*

651–658).—Additional data from the uniform winter-hardiness oat nurseries substantiated, in most cases, results of 10 previous years (E. S. R., 86, p. 618). Hairy Culberson, relatively unproductive, was the hardiest oats grown during the 15-yr. period, but certain new varieties, including Tennex, Fulwin, and Wintok, were as hardy as or slightly hardier than Hairy Culberson and are high-yielding. Letoria, Ranger, Rustler, and Fultex, resulting from crosses of Victoria with Lee, Nortex, or Fulghum, combine the crown rust and smut resistance of Victoria with the hardiness of their other parents. Selection C. I. 3725 is resistant to crown rust, stem rust, and smut and appears about equal to its Red Rustproof parent in winter hardiness. Breeding of hardy varieties having resistance to all these diseases apparently should be possible.

Root development in oat varieties, R. A. DERICK and D. G. HAMILTON (*Sci. Agr., 22* (*1942*), *No. 8, pp. 503–508, illus. 3*).—Oats varieties (five) grown at Ottawa, Ont., differed widely in total mass of root growth and in number and coarseness of anchorage roots. Resistance to lodging was definitely related to type of root growth.

Analysis of nonheritable variations in seed set under bag among plants of orchard grass, Dactylis glomerata L., W. M. MYERS. (U. S. D. A. et al.). (*Jour. Amer. Soc. Agron., 34* (*1942*), *No. 12, pp. 1111–1121*).—Analyses of the magnitude and nature of variations between and within years in number of seeds per panicle set under bag among clonal lines of orchard grass showed differences between years and the interaction of clones×years to be statistically significant. The mean square for error was high; the standard error of a single determination approached the magnitude of the mean seed set. The error variance was found to be composed of variation among clonal rows within replications, among plants within clonal rows, and among bags on each plant. A formula given enables calculation of methods of reducing error variance. Protection of culms with cotton at the base of the bag was without effect on seed set. One, two, and four panicles enclosed per bag did not differ much from each other in number of seeds per panicle, but eight panicles per bag resulted in fewer seed. The earlier panicles set more seeds than the later panicles on the same plant.

Peanut growing, W. R. and J. H. BEATTIE (*U. S. Dept. Agr., Farmers' Bul. 1656, rev.* (*1943*), *pp. 31, illus. 19*).—A revision of the edition noted earlier (E. S. R., 65, p. 225).

Peanuts for oil: A war crop for farmers in hill areas of Mississippi, P. S. McCOMAS, J. F. O'KELLY, and F. J. WELCH. (Coop. U. S. D. A.). (*Mississippi Sta. Bul. 376* (*1943*), *pp. 20, illus. 7*).—Information on cultural and harvest practices, place of the crop in the farm organization, and comparative incomes from peanuts, cotton, and corn are presented from experiences of growers of Spanish peanuts in 1942, station findings, and opinions of county agents and other agricultural workers. The recommendations and conclusions are deemed applicable to the Clay Hills, Longleaf Pine, and Coastal Plain areas. Practices indicated as profitable include well-drained sandy soils broken or ridged well before planting; planting soaked Spanish peanuts in hull at rate of 60 lb. per acre, or shelled and dusted peanuts 30 lb. per acre, about April 15–May 15 in hills 6 in. apart in 24–30-in. rows; cultivation with harrows to suppress grass and weeds and break crust, and later with sweeps and shovels to work soil to plants; and digging with turning plow or middle-buster, with wings removed, when most nuts are fully developed and inside of shell begins to color, and stacking around a 6–8-ft. pole with cross bars with nuts in center to prevent weathering. For most economical threshing and marketing, production should largely be concentrated within communities well adapted to peanuts. An orderly marketing program should be worked out so that peanuts may be sold without delay.

Full-time buyers should be established in counties that produce 300 tons or more of nuts.

The value of organic matter and irrigation in the production of potatoes in Alabama, L. M. Ware. (Ala. Expt. Sta.). (*Amer. Potato Jour., 20 (1943), No. 1, pp. 12–23*).—Experiments with potatoes at Auburn and Fairhope, Ala., 1938–42, indicated that the values of irrigation and of organic material are affected greatly by the time of the year applied, amount of fertilizer used, climatic factors for a given year, level of organic matter in the soil, and by the concurrent use or omission of the one or other practice. Both practices benefited yield, with organic matter, as sericea lespedeza, vetch, or cowpeas, of the greater importance to the spring crop and irrigation to the fall crop, although the full value of each practice was obtained only in combination. See an earlier note (E. S. R., 87, p. 513).

Nutrient value of some new phosphatic materials used on potatoes, G. V. C. Houghland, K. G. Clark, A. Hawkins, and J. C. Campbell. (U. S. D. A. and Maine and N. J. Expt. Stas.). (*Amer. Fert., 97 (1942), No. 7, pp. 5–8, 24, 26*).—Potato fertilizers, each with P supplied by one of the ordinary and triple superphosphates, calcined, fused, and dicalcium phosphates, monocalcium chlorophosphate, and calcium and potassium metaphosphates, were compared in Maine, New Jersey, and Pennsylvania from 2 to 4 yr., none of the materials being injurious to potatoes. Yields did not always equal those with ordinary superphosphate, but responses appeared satisfactory. Potatoes grown on acid soils apparently could utilize P readily from the new phosphatic materials.

Effect of fertilizer on potato yields, B. E. Brown. (U. S. D. A. coop. Maine, Mich., N. J., N. Y., Ohio, Pa., and Va. Truck Expt. Stas.). (*Amer. Fert., 98 (1943), No. 1, pp. 7–8, 26, illus. 2*).—Potatoes receiving fertilizer in 171 field experiments over different periods in 7 States made an over-all average yield of 247 bu. per acre and unfertilized 174 bu. This was an increase of 42 percent, or if results were weighted according to number of tests in each area the increase averaged 91.5 bu. or 52 percent. Irish Cobblers grown 1917–38 on Caribou loam in Aroostook County, Maine, averaged 334 bu. fertilized and 194 bu. unfertilized, an increase of about 72 percent.

The Pawnee potato, W. C. Edmundson, L. A. Schaal, and A. M. Binkley. (Coop. Colo. Expt. Sta.). (*U. S. Dept. Agr. Cir. 665 (1943), pp. 6, illus. 2*).—Pawnee, developed by crossing Rural New Yorker and Katahdin potatoes, is a rapid-growing variety with smooth, short elliptical to roundish uniform tubers having very few and shallow eyes and relatively tough skin; has good cooking and keeping qualities; and is very promising for both the early and late crop in the Greeley (Colo.) district.

Registration of improved sorghum varieties, III, R. E. Karper. (Tex. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 3, p. 280*).—Norkan, selected from Atlas × Early Sumac and approved for registration (E. S. R., 86, p. 185), is a white-seeded, early-maturing sorgo adapted for areas north of the latitude where Atlas is grown.

The effects of soil structure on sugar beet growth, R. B. Farnsworth (*Ohio State Univ., Abs. Doctoral Diss., No. 35 (1941), pp. 167–183, illus. 7*).—The main conclusion from the research has essentially been noted from another source (E. S. R., 88, p. 16).

Sulfur and nitrogen deficiency relationships in sugar beets grown for seed in Oregon, B. Tolman and G. L. Stoker. (U. S. D. A. et al.). (*Jour. Amer. Soc. Agron., 33 (1941), No. 12, pp. 1072–1079, illus. 4*).—On sugar beets grown for seed in the Willamette Valley, N deficiency was shown by retarded, spindly growth, yellowish green color, and fewer plants entering into seed production, and S deficiency by retarded growth, yellow color, break-down of leaf tissue, and increased susceptibility to *Ramularia* leaf spot. Many plants also developed a trotzerlike vegetative growth instead of normal flowering. S application did not affect seed production where N was not applied, and response to N was much greater with S treatment. Need for both S and N in commercial sugar beet seed production in the section was evident.

Nitrogen and sugar cane: The nitrogen index and certain quantitative field aspects, H. F. Clements and S. Moriguchi. (Hawaii Expt. Sta.). (*Hawaii. Planters' Rec.* [*Hawaii. Sugar Planters' Sta.*], *46* (*1942*), *No. 4, pp. 163–190, illus. 12*).—Plants from each of 14 field plats of 31–1389 sugarcane, grown under field conditions at Waipio and Kailua, including 4 plats of plant cane and 3 of ratoon cane at each place, were collected monthly, separated into their various parts, and analyzed for total N. The elongating cane blades and the green-leaf cane blades and leaf punches from these leaves were found satisfactory as indices. The amounts of N contained within each of four crops are calculated and discussed in relation to the quantities of N fertilizer applied. See earlier notes (E. S. R., 84, p. 308; 87, p. 218).

A search for guidance in the nitrogen fertilization of the sugar cane crop.—I, The plant crop, R. J. Borden (*Hawaii. Planters' Rec.* [*Hawaii. Sugar Planters' Sta.*], *46* (*1942*), *No. 4, pp. 191–238, illus. 23*).—When a plant crop of 32–8560 cane had received 100 lb. of N per acre, an additional 60 lb. applied in June when the crop was 10.5 mo. old had, at the final harvest 10 mo. later, (1) definitely increased the percentage of N in the total dry weight, in leaf-punch samples, and in crusher juice, the percentage of chlorophyll in green-leaf blades, tons per acre of reducing sugars, and pounds of N per acre in the dry weight; (2) possibly increased total green and dry weights, percentages of tops and of moisture in green weight, percentage of reducing sugars, total tons of sucrose and of total sugars, and tons of millable cane and of commercially recoverable sugar; (3) decreased the percentage of P in the total dry weight; (4) possibly decreased percentages of sucrose and of total sugars; and (5) had no effect on the yield percent cane. In a comparable crop which received 160 lb. of N, the additional 60 lb. (1) definitely increased the N percentage in total dry weight and in crusher juice and the percentage and tonnage of reducing sugars; (2) possibly increased the N percentage in leaf-punch samples, pounds of N in total dry weights, and percentages of sucrose and of total sugars; (3) possibly decreased the yield percent cane and commercial sugar yield; and (4) probably had no effect on total green and dry weight, or yield of millable cane, the percent tops and moisture, chlorophyll in the leaf blades, percentages of P_2O_5 and K_2O in the total dry weight, or tonnages of sucrose and of total sugars.

The differences in N treatments were identified quickly by changes in the N percentages found in samples of total dry weight, leaf-punch samples, leaf blades, or of crusher juices. Thus, any one of these analyses reflected the N supply available up to time of sampling.

Cross fertility relationships of "Golden Annual" sweet clover with common species of Melilotus, I. J. Johnson. (Iowa Expt. Sta.). (*Jour. Amer. Soc. Agron.*, *34* (*1942*), *No. 3, pp. 259–262*).—Golden Annual, a yellow-flowered sweetclover obtained from a single plant in seed from Mongolia, China, is an annual form of *M. suaveolens* according to the cross-fertility relationship as measured by seed setting and seed weight in crosses with varieties of *M. alba*, *M. officinalas*, and *M. suoveolens*. The annual form is dominant in F_1 over the biennial in the same species.

Two new varieties of flue-cured tobacco, 400 and 401, E. G. Moss and J. F. Bullock. (Coop. U. S. D. A.). (*North Carolina Sta. Bul. 337* (*1942*), *pp. 8, illus. 3*).—The 400 variety, developed by selection from plants in Guilford

County showing resistance to black root rot in 1930, is highly resistant but not immune to the disease and seems also to be slightly resistant to some of the leaf diseases, cures easily, and produces high yields of cigarette leaf, especially smoking leaf and lugs. Chemically it was found as good as the better standard flue-cured varieties. The 400 variety is recommended only for the Middle and Old Belts of North Carolina and Virginia.

The 401 variety, derived from a cross of 400 and Cash, possesses a favorable combination of characteristics of parents in color, size, and body of leaf, together with partial resistance to root rot and apparently resistance to certain leaf spot diseases. It has outyielded the standard flue-cured varieties, and the crop has a large percentage of lugs. The 401 appears suitable for culture throughout the flue-cured area.

Annual report of the Tobacco Institute of Puerto Rico, C. Esteva, Jr. (*Tobacco Inst. Puerto Rico Ann. Rpt., 1940, 1941, pp. 98+, illus. 7*).—Research and other work of the institute reported on resembled that noted earlier (E. S. R., 84, p. 328) and also included studies of tobacco insects.

Viability of velvetbean, Stizolobium spp., seed as affected by date of harvest, weathering, storage, and lodging, O. L. Justice and M. D. Whitehead (*Jour. Amer. Soc. Agron., 34 (1942), No. 11, pp. 1000–1009*).—Velvetbean seed harvested from fields in central Alabama between September 20, 1941, and February 7, 1942, were grouped as to maturity of pods and seeds and shriveled condition of the testa and visible mold thereon. Ripe or nearly ripe seed taken from green pods and tested just after harvest gave a higher percentage of active germination but a lower total percentage of viable seed than when tested in April. Seed harvested during November germinated better, but seed harvested in early December showed little loss in viability if seed lying on the ground were excluded. Seed taken from scandent vines December-February had depreciated considerably in viability, as did seed harvested from lodged vines. Velvetbean seed should be harvested in November or early December in central Alabama. Seed or pods harvested earlier may be high in moisture and thus become damaged through respiration and heating during storage. When harvest is postponed until December or later, many vines may become lodged, with a resulting loss in value of seed. Commercial lots of seed stored in the laboratory for 1 yr. depreciated very little in germination, and shelled and unhulled seed retained viability equally well.

Seed yields of velvet bent, Agrostis canina L., as influenced by the kind of fertilizer applied, J. A. DeFrance and T. E. Odland. (R. I. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 3, pp. 205–210*).—Comparison of effects of six fertilizer ratios, applied at the rate of 1,000 lb. per acre, on Piper velvet bent, 1936–39, showed that higher seed yield followed increase in the N in the ratio, and that medium proportions of P and small proportions of K sufficed. While hay yields decreased in succeeding years with a consequent narrowing of the seed : hay ratio, hay yield was increased by additional units of N and by high P. Addition of two units of K had no consistent effect. The higher N ratios resulted in increases in percentage of stand and in amount of lodging and in slightly decreased weight per bushel of cleaned seed. The results suggested an annual application of from 600 to 800 lb. per acre of a fertilizer, as 10–5–5, 10–6–4, or 8–6–4, for use in seed production. See also an earlier note (E. S. R., 72, p. 610).

Earliness of maturity as a factor influencing seed production in vetch, H. R. Albrecht. (Ala. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 7, pp. 662–667, illus. 2*).—Early-maturing vetches (E. S. R., 87, p. 666) generally were the best seed producers. They apparently are more prolific than later-maturing vetches and are past flowering and have ripened at least most of their seed before high temperatures and humidity prevail. They also escape the severe late-spring insect (especially pea aphid and corn earworm) devastations so destructive to seed crops of late-maturing vetches in Alabama. Promising strains selected from monantha vetch (*Vicia monantha*) are heavy seed producers, capable of vigorous early-spring growth which permits early turning for green manure. The LaFayette and Monala monantha varieties are hardy enough for all sections of the State. A few early-maturing strains of woollypod vetch (*V. dasycarpa*) are also superior seed producers but shatter as pods ripen.

The importance of various roots to the wheat plant, B. J. Sallans (*Sci. Agr., 23 (1942), No. 1, pp. 17–26, illus. 1*).—The relative importance to the wheat plant of the seminal and crown root systems and individual roots was determined by root amputations and their effects upon plant yields. After becoming well established roots contributed independently of each other to the final yield of grain. The primary seminal root proved the most valuable individual root and equal in importance to both roots of the first pair of lateral seminal roots. The second pair of seminal roots, the sixth seminal, and coleoptile axillary roots proved much less valuable than the first three seminal roots, being about as valuable root for root as the crown roots. Contributions of the crown roots, individually small, were in the aggregate usually larger than those of the seminal roots. Much variation in crown root contributions to yield may occur with variation in seasonal precipitation and soil moisture. The relation of the roots to the plant's water supply and the influence of root amputation upon water supply is discussed, and also the parallel between artificial amputation of roots and that due to root infection by root-rotting soil micro-organisms.

Wheat' grains without embryos, O. A. Stevens. (N. Dak. Expt. Sta.). (*Science, 97 (1943), No. 2508, p. 91*).—The proportion of embryoless seeds in Ceres of the 1941 crop was similar to that found by Lyon (E. S. R., 59, p. 518).

The distribution of thiamin in the wheat plant at successive stages of kernel development, W. F. Geddes and M. N. Levine. (Minn. Expt. Sta. coop. U. S. D. A.). (*Cereal Chem., 19 (1942), No. 5, pp. 547–552, illus. 1*).—The thiamin concentration in kernels of early- and late-sown Thatcher and late-sown Ceres wheat decreased slightly during the first few weeks after blossoming and then remained relatively constant, with an apparent slight increase at full maturity. It decreased markedly in glume and stem fractions as the kernels filled. In the mature plant values for glume fractions were only from 18 to 25 percent and those for stem fractions from 38 to 57 percent of those at 7 days after blossoming. The concentration in tillers as a whole changed little with maturity. Total thiamin in kernels increased, while that in glume and stem fractions decreased greatly throughout the ripening period. The bulk of the thiamin in the mature plant was present 1 week after blossoming and was translocated from glumes, rachis, stems, and leaves into developing kernels. Thus in early-sown Thatcher about 25 percent of the total thiamin of the tiller was in the kernels, 15 in the glume, and 60 percent in the stem fraction at 7 days after blossoming. In the mature tiller the kernels contained about 77, glume 2, and stem fraction 21 percent.

Natural selection in varietal mixtures of winter wheat, H. H. Laude and A. F. Swanson. (Kans. Expt. Sta. and U. S. D. A.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 3, pp. 270–274, illus. 1*).—The rate of cumulative changes from year to year, 1932–40, in a winter wheat varietal population when Kanred was mixed with Harvest Queen and with Currell was so rapid in each case as to shift the varietal ratios from equal proportions to nearly pure stands of Kanred in less than 9 yr. Such changes might be attributed to competition among plants resulting in survival of a larger proportion of the better-adapted Kanred and to production of more seeds per plant by surviving Kanred plants.

Progress in the improvement of wheat varieties for North Dakota, T. E. Stoa, L. R. Waldron, R. H. Harris, and L. D. Sibbitt (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 3, pp. 3–11, illus. 1*).—Further studies confirmed observations (E. S. R., 88, p. 626) on the crop of 1942 when conditions combined to give crops of excellent yields, high test weights, an average protein content, and excellent milling and good baking qualities. Tables show yields of leading varieties at different stations in 1942 and over periods and quality data for eight varieties. Growing seasons since 1936 are reviewed, with brief descriptions and discussion of relative merits and limitations of available varieties, including Thatcher, Rival, Pilot, Regent, Renown, and Vesta, and Mindum, Kubanka, and Red durum, as a basis for determining which to grow in 1943.

Summary of results of seed and legume inoculant inspection for 1940 [and 1941], J. G. Fiske (*New Jersey Stas. Insp. Ser. 1 (1941), pp. 24; 6 (1942), pp. 25*).—Dealers in New Jersey from whom 2,525 official samples of farm crop and vegetable seed and seeds mixtures were collected in 1940 and 2,060 in 1941 are listed, with compliances and violations, and crops, inoculations, and number of organisms are shown for 38 official samples of legume inoculants in 1940 and 29 in 1941.

Testing farm seeds at home, E. L. Erickson (*South Dakota Sta. Cir. 43 (1943), pp. 8, illus. 7*).—Practical methods for testing field crops seeds for germination and estimating purity and noxious weed seed content.

Dandelion control with dichloroethyl ether, W. C. Templeton, Jr., and P. O. Ritcher. (Ky. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 3, pp. 283–284*).

Seasonal variations in drought resistance of exposed rhizomes of quack grass, S. T. Dexter. (Mich. Expt. Sta.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 12, pp. 1125–1136, illus. 4*).—Marked seasonal fluctuation in drought resistance and sprouting ability was found in quackgrass rhizomes (E. S. R., 78, p. 43; 81, p. 511) dug at intervals, 1939–41, and subjected to various degrees of desiccation. A close positive correlation was found between total N content and sprouting ability before and after exposure to drought. Rhizomes dried to a water content of 40 percent of the total weight may be killed in July but only slightly injured in November. In very early spring or late fall rhizomes dried to a 30-percent water content may survive to a considerable extent, and in November and December rhizomes dried to less than 20 percent water have sometimes survived. When killing is to be accomplished largely through drying out, as with the field cultivator, the field might be harrowed very thoroughly early in the season.

Perennial sow thistle and its smooth variety in Canada, H. Groh (*Sci. Agr., 23 (1942), No. 2, pp. 127–130*).—Distribution of the two weeds in Canada.

The water hyacinth in California, I. L. Wiggins (*Science, 97 (1943), No. 2510, pp. 138–139*).—Increase of *Eichornia crassipes* in the San Joaquin River drainage system is noted, with comment on its occurrence elsewhere in California and potential menace to navigation.

HORTICULTURE

The city home garden, W. R. Beattie (*U. S. Dept. Agr., Farmers' Bul. 1044, rev. (1942), pp. 30+, illus. 14*).—This revised edition (E. S. R., 40, p. 833) includes general information on planning, planting, and care.

Disease-resistant varieties of vegetables for the home garden, R. J. Haskell and V. R. Boswell (*U. S. Dept. Agr. Leaflet 203, rev. (1943), pp. 8*).—This is a revised edition (E. S. R., 84, p. 759).

Production, diseases, and insects of garlic in Texas, G. E. Altstatt and H. P. Smith (*Texas Sta. Cir. 98 (1942), pp. 13, illus. 7*).—Information is offered on soils and fertilizers, varieties, methods of planting, cultivation, harvesting, control of disease and insect pests, market grades, etc.

Origin, dispersal, and variability of the lima bean, Phaseolus lunatus, W. W. Mackie (*Hilgardia [California Sta.], 15 (1943), No. 1, pp. 29, illus. 3*).—An intensive study of many different types and forms of lima beans led to the conclusion that they all belonged to a single species, *P. lunatus*. The many forms of vines, pods, and seeds are believed the result of genic, or character, differences brought about by field hybridization or by mutants common to this species. Crosses between various so-called species were fully fertile, and all forms were found to have 11 haploid chromosomes. A number of fungus diseases and insect pests were found specific in their attacks on lima beans.

The author discusses the probable geographical origin (Guatemala) of the lima bean and indicates three probable lines of dispersal: (1) the Hopi branch, extending northward to the United States; (2) the Carib branch, extending eastward through the islands of the West Indies to eastern South America; and (3) the Inca branch, extending southward to Peru. The author suggests that a knowledge of the origin and dispersal and of the unity of the species should be helpful to plant breeders seeking to create new horticultural varieties. The unity of all the lima beans in a single species is further supported by the presence of the glucoside linamarin, the result of two enzymes imparting the characteristic lima bean flavor found in no other bean.

Growing peas for canning and freezing, W. R. Beattie, L. L. Harter, and B. L. Wade (*U. S. Dept. Agr., Farmers' Bul. 1920 (1942), pp. 22+, illus. 7*).—This supersedes Farmers' Bulletin 1255 (E. S. R., 47, p. 139) and contains information as to climatic requirements of the pea crop, rotations, preparation of the soil, fertilizing and manuring, inoculation of the seed, varieties, planting, control of plant diseases, harvesting, loading and transporting, yields and costs, vine disposal, and the use of vines as cattle feed and as manure.

The determinate tomato and its relation to prairie horticulture, R. M. Adamson (*Sci. Agr., 23 (1943), No. 5, pp. 265–272*).—A comparison of some of the new determinate-type tomato varieties, such as Bounty, Victor, and Firesteel, with early-maturing indeterminate kinds, such as Break o' Day and Earliana, showed the vine spread of the determinates to be significantly less than that of the indeterminates. Earliness, as represented by total yield during the first 2 weeks of harvest, was more pronounced in the early determinates than in the early indeterminates. Determinate vines outyielded significantly the others when neither was pruned or staked.

Growth-promoting chemicals improve greenhouse tomato production, F. S. Howlett (*Ohio Sta. Bimo. Bul. 220 (1943), pp. 17–27, illus. 9*).—Investigations conducted at different seasons of the year led to the conclusion that the effectiveness of indolebutyric acid treatment in promoting fruit setting in the tomato is dependent on several factors, such as viability of pollen, amount of pollen tube growth, and the amount of fruit already set on the plant. The greatest improvement occurred under conditions of low light intensity and during the relatively short days of January to March. When there was a heavy set of tomatoes on the early clusters, treatment did not prevent the dropping of flowers on the lower clusters. However, because of the favorable results obtained during certain critical periods in the greenhouse, the author suggests that commercial growers give the procedure a limited trial and outlines the methods to be followed.

Effects of vaporous naphthoxyacetic acid on development of tomato fruits, with special reference to their vitamin C content, J. W. Mitchell and M. R. Whitehead. (U. S. D. A.). (*Bot. Gaz., 104 (1942), No. 2, pp. 362–365, illus. 2*).—The application of naphthoxyacetic acid vapor to the flowers of greenhouse tomatoes resulted in the development of a high percentage of seedless fruits. In treated plants of the Marglobe variety 98, 92, and 80 percent of the fruits on the first, second, and third clusters, respectively, were seedless, while only 6 percent of those on the untreated fourth cluster were without seeds. With respect to vitamin C content, the nutritional value of ripe fruits developed from treated flowers was equal to that of fully seeded untreated fruits.

Tomato growing in Michigan, S. B. Apple (*Michigan Sta. Spec. Bul. 131, rev. (1943), pp. 20, illus. 8*).—A revision of an earlier edition (E. S. R., 51, p. 441), this contains information regarding climatic requirements, soils, soil management, fertilization, plant production, use of southern-grown plants, setting plants in the field, use of starter solutions, cultivation, varieties and variety improvement, harvesting and marketing, etc.

Production of turnips and rutabagas, W. R. Beattie (*U. S. Dept. Agr. Leaflet 142, rev. (1943), pp. 4*).—A revised edition (E. S. R., 78, p. 627).

A useful pollination method for watermelons, M. N. Walker. (Fla. Expt. Sta.). (*Jour. Hered., 34 (1943), No. 1, pp. 11–13, illus. 2*).—A method of technic is described in which small cloth-wire cages are covered with coarse unbleached muslin and used for covering watermelon blooms.

Propagation of fruits for home gardens, C. H. Ragland (*Miss. Farm Res. [Mississippi Sta.], 6 (1943), No. 2, pp. 2, 3–6, illus. 17*).—With the aid of appropriate illustrations, information is given on the various methods of propagating fruit and nut plants by cuttings, layers, budding, and grafting.

The home apple orchard, C. W. Ellenwood (*Ohio Sta. Bimo. Bul. 220 (1943), pp. 13–16*).—Information is offered on varieties, selection of sites, nursery stock, pruning, fertilizing, spraying, rejuvenation of old orchards, etc.

Two new apples, W. H. Alderman, A. N. Wilcox, T. S. Weir, F. E. Haralson, W. G. Brierley, and J. D. Winter. (Minn. Expt. Sta.). (*Minn. Hort., 71 (1943), No. 2, pp. 21–22, illus. 2*).—Victory and Fireside, two new apple varieties produced at the Excelsior Fruit Breeding Farm, are described as to tree, flower, and fruit characters, together with comments on origin, potential uses, etc.

A comparison of lime sulphur and flotation sulphur spray on apple trees, E. P. Christopher. (R. I. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 40 (1942), pp. 63–67, illus. 2*).—In a comparison of liquid lime-sulfur and flotation sulfur for spraying young and mature apple trees, it was found that the latter was not only the safer of the two materials from the standpoint of leaf injury but resulted also in a lesser reduction of carbon dioxide assimilation, more stored starch, higher yields of fruit, and greater growth.

Response of apple trees to potash in the Champlain Valley.—II, A third-year growth response and a first-year reduction in leaf scorch, A. B. Burrell, J. C. Cain, and L. A. Brinkerhoff. (Cornell Univ.). (*Amer. Soc. Hort. Sci. Proc., 40 (1942), pp. 8–12*).—This second progress report (E. S. R., 85, p. 621) presents observations and results in the third year of treatment on McIntosh trees severely deficient in potassium. Leaf scorch was greatly reduced the second year, and terminal growth increased the third year of heavy concentrated annual applications of potash dug into the soil. A striking decrease in potassium content of the foliage accompanied these responses. Although now 11 years of age, these trees are small and have had few blossoms.

In an experiment with 6-year-old trees, heavy applications of potassium just before bloom greatly reduced the amount of leaf scorch the current year. The results were similar whether muriate or sulfate was used, whether the material was broadcast over the entire surface of the soil within a small circle approximating the spread of the branches, over a circle of twice the diameter, or broadcast over a small circle and dug into the soil among the roots. Spraying a 1-percent solution of K_2SO_4 on the foliage gave a suggestion of more rapid control of scorch, but the possible superiority was not maintained throughout the summer and there was indicated a possibility of foliage injury from products of its reaction with arsenicals. No clear-cut benefits from potassium treatments in the absence of the leaf-scorch symptom were found.

Fruit maturity and growth of apple trees as affected by boron content (preliminary report), L. P. Batjer and M. H. Haller. (U. S. D. A.). (*Amer. Soc. Hort. Sci. Proc., 40 (1942), pp. 29–30*).—Applications of borax made 3 weeks before bloom at the rate of ⅛ lb. to 8-year-old and 1 lb. to 20-year-old trees had no measurable effects on growth after two seasons but did increase the boron content of the leaves on terminal shoots and in the fruits. Fruits from the borax-treated trees, except York Imperial, tended to soften more rapidly in storage, and in the second season following treatment there was a marked increase in preharvest dropping on the boron-treated trees. Fruits from the treated trees, especially Jonathan, tended to color earlier. When fruit was picked at about the normal harvest date the checks developed somewhat more storage scald, but this condition was offset by the greater amount of decay and break-down in the fruit of the boron-treated trees.

The effect of peat moss on the first two seasons' growth of apple and peach trees set in 1939 in West Virginia (preliminary report), R. H. Sudds and D. S. Brown. (W. Va. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 40 (1942), p. 54*).—The incorporation of 12 qt. of wet peat moss with the soil placed about the roots of newly planted apple and peach trees failed to result in any measurable growth effects such as indicated by trunk girth increment, branch elongation, or height of tree. The soils used in the investigation were well-drained residual materials, well-adapted to fruit growing.

Chemical changes accompanying growth and development of seed and fruit of the Elberta peach, F. A. Lee and H. B. Tukey. (N. Y. State Expt. Sta.). (*Bot. Gaz., 104 (1942), No. 2, pp. 348–355, illus. 1*).—The results of chemical analyses made of the fleshy pericarp, stony pericarp, integuments, nucellus, endosperm, and embryo of Elberta peaches in various stages of development showed the necessity for careful separation of the various tissues and parts intended for analyses. For example, during stage 1 when active growth was taking place in the fleshy and stony pericarp and nucellus and integuments, the percentage moisture was relatively high and such labile forms as reducing sugars were fairly high in amount. On the other hand, in the final stage 3 when increase in size of fleshy tissue was rapid, sucrose content increased markedly and the moisture content slightly, while the percentages of reducing substances, ether extract, nitrogenous materials, and ash declined.

Pruning methods for bearing peach trees, W. H. Upshall and O. A. Bradt (*Sci. Agr., 23 (1943), No. 5, pp. 257–264, illus. 4*).—From the fifth to the ninth year peach trees were pruned in three different manners: (1) Removal of dead, dying, and very weak wood and low drooping branches; (2) same as (1) plus a heavy heading back of the extremities of all branches; and (3) same as (1) plus about half of the smaller laterals arising on 1-yr. wood. In the fifth year a few large near-vertical branches were removed from all treatments. Treatment (2) removed some wood, reduced growth rate, caused longer terminal growth, delayed fruit maturity with sometimes less surface color at the same stage of maturity. There was an appreciable reduction in income per tree from treatment (2) as compared with treatments (1) and (3). Although the percentage of the crop above No. 2 grade was somewhat higher in treatment (2) than in treatment (1), there was actually less weight of fruit in the better grades.

Bush fruits in the home garden, J. V. Patterson (*New Jersey Stas. Cir. 444 (1943), pp.* [*4*]).—Brief general information is given on soils, planting, fertilizers, mulching, pruning and training, and pest control.

Histological study of freezing, desiccation, and winter injury of raspberry canes, A. O. Simonds. (Colo. Expt. Sta.). (*Bot. Gaz., 104 (1942), No. 2, pp. 356–361, illus. 8*).—Histological examinations of tissues of field-injured Latham raspberry canes and canes subjected to freezing and drying in control chambers showed comparable types of injury. Phloem necrosis, phloem rupture, cambial rupture, and the deposition of tanninlike material in the outer parenchymatous stem tissues were characteristic of the field material. Canes subjected to continuous freezing in chambers revealed phloem rupture in dormant canes and ruptured cambial cells in nondormant canes, accompanied by limited phloem necrosis.

Blueberry storage, F. B. Chandler. (Maine Expt. Sta.). (*Science, 95 (1942), No. 2476, pp. 603–604; abs. in Maine Sta. Bul. 411 (1942), p. 403*).—Studies conducted under controlled temperature and atmosphere conditions showed great variation in the keeping quality of the fruits of different clones of lowbush blueberries and of varieties of highbush blueberries. Fruits stored at 5° C. (41° F.) in a modified atmosphere containing 5 percent or slightly less of oxygen were in the best condition at the end of the experiment. The author suggests that blueberries may be held in good commercial condition for from 2 to 4 weeks and will remain in a fairly satisfactory state for much longer periods.

Growing strawberries in Idaho, L. Verner (*Idaho Sta. Bul. 249 (1942), pp. 14, illus. 1*).—General information is presented on the selection of soil and site, varieties, propagation, handling and setting of plants, methods of arrangement, soil management, mulching, bed renewal, harvesting and handling, etc.

Differentiation of avocado blossom buds in Florida, P. C. Reece. (U. S. D. A.). (*Bot. Gaz., 104 (1942), No. 2, pp. 323–328, illus. 13*).—Information is given on the time of flower-bud differentiation in the Lula and Nabal varieties growing in southern Florida.

Anatomy and histology of the Eureka lemon, E. S. Ford. (Cornell Univ.). (*Bot. Gaz., 104 (1942), No. 2, pp. 288–305, illus. 47*).—The results are presented of a study of the flowers and fruit collected in southern Texas and southern California.

Potassium and phosphate nutrition of pineapple in relation to nitrate and carbohydrate reserves, G. T. Nightingale (*Bot. Gaz., 104 (1942), No. 2, pp. 191–223, illus. 25*).—A low reserve of nitrate was found adequate for the greatest possible yields when carbohydrates were low. With high carbohydrates, maximum production was not obtained unless the plants were essentially filled to capacity with nitrates. When the concentration of carbohydrates was low and relatively little nitrate was supplied, phosphate was freely absorbed, even from cells rather low in phosphorus Under field conditions in Hawaii, nitrate is not absorbed freely by the plant when K is low. When carbohydrates are high, and relatively much nitrate is therefore required, additional K is essential for nitrate absorption above that necessary for other functions that K performs. In plants in soil notably low in K and P, there was apparently an interplay of compensating relationships. P was necessary in relatively high concentrations just prior to and during blossom bud differentiation. An adequate supply of nitrate in relation to carbohydrates was also essential at this stage.

Spindle abnormalities in Mentha, C. P. Swanson and R. Nelson. (Mich. Expt. Sta.). (*Bot. Gaz., 104 (1942), No. 2, pp. 273–280, illus. 20*).—Certain meiotic spindle irregularities observed in *M. piperita*, *M. spicata*, and six of their interspecific hybrids were found to be dependent on the action of a gene transmitted from the *M. spicata* parent to all of its progeny. The effect of the gene was to induce an unstableness of spindle form and behavior which is subject to environmental factors.

The cultivation of medicinal plants (*[Gt. Brit.] Min. Agr. and Fisheries Bul. 121 (1942), p. 27+*).—Information is given on the cultural requirements and the handling of a large number of plants, including aconite, angelica, anise, belladonna, caraway, camomile, coriander, digitalis, dill, fennel, henbane, lavender, licorice, parsley, pennyroyal, peppermint, poppy, psyllium, rhubarb, rosemary, and valerian.

Tung growing in Latin America, J. L. Wooster (*U. S. Dept. Agr., Off. Foreign Agr. Relat., Agr. in Americas, 3 (1943), No. 2, pp. 29–33, illus. 5*).—Together with a descriptive account of the tree and fruit, information is presented on the status of tung production in Paraguay, Argentina, and Brazil.

Chlorosis-resistant ornamental shrubs, F B. Wann (*Farm and Home Sci. [Utah Sta.], 4 (1943), No. 1, p. 15*).—Based on several years' observations at the Utah College, lists are presented of varieties showing Fe-deficiency chlorosis and those not developing it under conditions obtaining on the campus.

FORESTRY

Suggestions for the management of northern hardwood stands in the Northeast, V. S. Jensen. (U. S. D. A.). (*Jour. Forestry, 41 (1943), No. 3, pp. 180–185, illus. 1*).—Observations 5 yr. after cutting on a 15-acre clear-cut area in the Bartlett Experimental Forest of New Hampshire showed that intolerant species (such as pin cherry, paper birch, and large-toothed aspen) that were formerly absent or occurred in only limited numbers were dominating the stand. The frequency of sugar maple, beech, and striped maple in the stand following cutting was largely determined by their size and frequency in the advance understory. Apparently natural succession following clear-cutting of northern hardwoods follows a reasonably uniform pattern beginning with pin cherry and aspen, which, in turn, yield to more tolerant and longer-lived species. The author recommends the complete clear-cutting of areas where mature or overmature trees make up most of the stand, the restriction of clear-cutting to groups of inferior trees in stands containing a large proportion of promising trees, and partial cutting of scattered individuals or small groups of trees in old-growth stands which have been opened up previously to such a degree that immature even-aged groups have taken over a considerable part of the area. Mowing and weeding of young stands are regarded as of questionable value.

New methods and results of growth measurement in Douglas fir, P. A. Briegleb and J. W. Girard. (U. S. D. A.). (*Jour. Forestry, 41 (1943), No. 3, pp. 196–201, illus. 4*).—Confronted with the problem of estimating growth of all forest stands, the Nation-wide forest survey has attempted to devise simple technics equally adequate for understocked and for well-stocked areas. One such method is described, followed by a preliminary analysis of the results obtained during the summer of 1941 in the Douglas fir region.

Field survival of vegetatively propagated Douglas fir, W. F. McCulloch (*Jour. Forestry, 41 (1943), No. 3, pp. 211–212*).—In January 1939, cuttings made of Douglas fir branch tips using 1-, 2-, and 3-yr. wood from a 50-year-old tree were treated by placing the basal ends for 8, 16, and 24 hr. in four concentrations of indolebutyric acid, namely, 3, 5, 8, and 10 mg. per liter of water. The cuttings were then placed in a rooting medium of half sand and half peat. When examined in September some callusing but no rooting was recorded in the 2- and 3-year-old materials. Each concentration of the 24-hr. treated

1-year-old material produced roots, and a few of the untreated controls also produced some roots. A certain number of the rooted treated cuttings did survive, but after 3 yr. had failed to assume a desirable type of growth, having no well-defined leaders.

Practical application of plant hormones in forest-tree propagation, L. W. Zach, D. Bauer, and H. Goodyear. (Oreg. State Col.). (*Jour. Forestry, 41 (1943), p. 214*).—Treatment of cuttings, seedlings, and seed of various forest species with indolebutyric acid gave no striking results. In the case of cuttings, the results indicated that for field-planting the treatments were not practical for the species used. The seedlings, including both 2–0 and 1–0 stock, showed no significant benefit from treatment. Seed treatment appeared worth while in the case of Port Orford cedar and sugar pine, of no significance for Douglas fir, and with negative results for western white pine.

Histological and anatomical changes induced by indoleacetic acid in rooting cuttings of Pinus strobus L., A. L. Delisle (*Va. Jour. Sci., 3 (1942), No. 5, pp. 118–124, illus. 6*).—The first noticeable anatomical change in cuttings taken from 4-year-old white pine trees and treated with aqueous solutions of indoleacetic acid was in the outer cortex, where a peridermlike layer was initiated. At the basal end of the cutting the wood cambium became very active, producing much parenchymatous secondary tissue. Cambial activity was greater at certain places, producing cushions of meristematic cells, which later became the root foundations. Pith cells did not become active at all. Adventitious roots were observed to arise also from the parenchyma of the leaf traces.

Jack pine regeneration following clear cutting on the Chippewa National Forest [Minn.], P. J. Zehngraff. (U. S. D. A.). (*Jour. Forestry, 41 (1943), No. 2, pp. 122–125*).—A satisfactory jack pine regeneration was obtained by exposure of the mineral soil on 60 percent or more of the surface, accompanied by slash disposal to distribute seed. These operations were preferably carried out in early spring or late fall after the possibility of fall germination had passed. The best results were obtained with 70- to 80-year-old well-stocked stands; and fully stocked young stands may not be expected from an open, brushy, understocked stand of overmature timber. Competition from herbaceous vegetation did not prove serious, except when scarification was done too long prior to logging.

Trend towards normality of stocking for second-growth loblolly pine stands, R. W. Wellwood (*Jour. Forestry, 41 (1943), No. 3, pp. 202–209, illus. 4*).—The purpose of this paper is to develop the theory that second-growth stands of loblolly pine have a measurable trend toward normality of stocking with increasing age. The theory is developed from data of temporary sample plats and supported by data from permanent sample plats.

Influence of light upon tree growth, F. G. Gustafson (*Jour. Forestry, 41 (1943), No. 3, pp. 212–213, illus. 1*).—Measurements taken on young white spruce and red pine trees grown in lath houses so constructed as to supply approximately three-fourths, one-half, and one-fourth of full sunlight showed the best height growth of spruce at three-fourths-light intensity, with little difference between half and full light. One-fourth light was definitely limiting in its effect on spruce. With red pine the results were not entirely satisfactory because of insects and various other factors, but the indications were that any reduction in light intensity was harmful. In white spruce, where height growth was about the same in half and full light, diameter growth was only 78 percent as great in the half light as in the open.

Pruning practices in open-grown longleaf pine in relation to growth, H. Bull. (U. S. D. A.). (*Jour. Forestry, 41 (1943), No. 3, pp. 174–179, illus. 1*).—

In studies with 1,443 trees ranging from 5 to 48 ft. in height and from 1 to 8 in. d. b. h., it was evident that net returns were about the same whether pruning to clear one 16-foot log was done as soon as possible without incurring any loss in growth, or somewhat earlier with the resultant loss of about 0.4 in. in diameter growth. Still heavier and earlier pruning that caused a loss of about 1.2 in. in diameter growth is believed less desirable. The removal of all side branches, leaving only the leader, was definitely undesirable. Pruning should be restricted to trees at least 18 ft. tall. As a rule, open-grown trees should be pruned to 40 to 50 percent of their total height. If 8-foot or similar short lengths of lumber are required, it is more profitable to clear one 16-foot log in two operations; first, when the trees are 18 ft. high and, second, when 34 ft. high.

Relative height growth of planted shortleaf pine and cut-back and uncut hardwood reproduction after release, F. G. Liming and B. F. Seizert. (U. S. D. A.). (*Jour. Forestry, 41 (1943), No. 3, pp. 214–216*).—A study of the height growth of planted shortleaf pine and hardwood reproduction in the Clark National Forest of Missouri led to the conclusion that on areas where the desired stocking of pine can be had by planting in openings in the reproduction, it is not necessary to cut the reproduction. Because of its quicker and greater response to release, the pine will dominate most of the hardwood reproduction established prior to release. On areas where some pine must be planted under hardwood reproduction in order to obtain adequate stocking, the overtopping reproduction should be removed. However, because of the high growth rate of the new sprouts from reproduction cut back at the time of overhead release, later cuttings may be necessary to prevent them from overtopping the pine.

Effect of litter removal on diameter growth of shortleaf pine, G. M. Jemison. (U. S. D. A.). (*Jour. Forestry, 41 (1943), No. 3, pp. 213–214*).—Over a period of years, all litter down to the mineral soil was removed annually from a half-acre plat. Increment core data taken in dominant and codominant shortleaf pines showed that, in trees from slightly over 10 in. to 13 in. d. b. h., raking had significantly reduced growth. However, from a practical viewpoint the reduction was not important and might well be offset by the value of the needles as mulch or litter.

Susceptibility of Japanese larch and jack pine to deer browsing, A. B. Recknagel. (Cornell Univ.). (*Jour. Forestry, 41 (1943), No. 3, p. 216*).—Observations in September 1942 in a planting of 2–1 stock of Japanese larch and jack pines established in May 1940 on a dry area in the Arnot Forest near Ithaca, N. Y., showed the Japanese larch to be free of browsing injury, although 34 percent of the trees had died, apparently from drought. The balance was vigorous and making good height growth. The jack pines, on the other hand, suffered severely from browsing, 34 percent being seriously injured.

Operating small sawmills in wartime, C. J. Telford. (Coop. Univ. Wis.). (*U. S. Dept. Agr., Misc. Pub. 509 (1943), pp. 42+, illus. 24*).—The important role of small sawmills in expanding the production of lumber needed for war purposes is stressed, and information is given as to the sizes of timber that should be cut for mills, the structure and operation of mills, handling and treatment of lumber, and on sawmill accounting. Plans for two small sawmills of portable type and for a semipermanent mill are included.

Wood for war emergency fuel, R. H. Peck (*Missouri Sta. Cir. 246 (1942), pp.* [*4*]).—The author briefly discusses the fuel value of Missouri tree species, how to cut and season fuel wood, and its efficient use and advantages.

DISEASES OF PLANTS

Patologia vegetal texto para uso de escuelas superiores y tecnicas [Plant pathology: A text for the use of technical and higher institutions of learning], J. R. JOHNSTON (*Guatemala: Tipog. Nac., 1942, pp. 230, illus. 39*).—The general portion of the text is concerned with the fundamentals, relations to other branches of science, and history of plant pathology, normal plant structure and physiology, symptomatology, classification of plant diseases, diseases parasitic, nonparasitic, and of unknown cause, and the technics of laboratory and field studies. The second half considers specific diseases due to slime molds, bacteria, and true fungi, including numerous keys to the organisms concerned An appendix treats briefly of the viruses, and an index to the genera of pathogens is provided.

The Plant Disease Reporter, [January 15–March 1, 1943] (*U. S. Dept. Agr., Bur. Plant Indus., Plant Disease Rptr., 27 (1943), Nos. 1, pp. 39, illus. 2; 2, pp. 41–91, illus. 5; 3–4, pp. 93–116, illus. 2*).—The following are included:

No. 1.—Crown rot (cause unknown), *Phymatotrichum* root rot, and other diseases of guayule, by W. N. Ezekiel; notes on tobacco and tobacco diseases in Puerto Rico during the early part of the 1942–43 season, by H. H. Foster, J. Vélez Fortuño, and G. Irizarry Rubio; notes on apple, peach, plum, and cherry diseases in the Ozark section of Arkansas in 1942, by J. C. Dunegan; observations on diseases of fruits and vegetables in Washington State, by L. K. Jones; the prevalence and severity of certain potato diseases in Colorado during 1942, by J. G. McLean and W. A. Kreutzer; asparagus rust in Illinois, 1940–42, by J. P. Fulton; spinach troubles in Arkansas, by S. B. Locke; observations of the prevalence and economic importance of stripe smut (*Ustilago striaeformis*) on bluegrass, by E. J. Wellhausen, K. W. Kreitlow, and J. G. Leach; some parasitic and saprobic fungi of southern Ohio, II–III (E. S. R., 85, p. 204), by W. B. Cooke; brief notes on *Verticillium* wilt of cotton in Tennessee; and host-parasite check-list revision (*Washingtonia* to *Zanthoxylum*), by F. Weiss.

No. 2.—A list of names and synonyms of phytopathogenic bacteria occurring in the United States embodying recent changes in nomenclature, by F. Weiss and J. I. Wood (this is to serve as a standard for usage in the *Plant Disease Reporter* and in the host-parasite check-list revision by Weiss); some diseases of guayule in California, by W. A. Campbell, L. D. Leach, J. T. Presley, and W. C. Snyder; the susceptibility of guayule to *Phymatotrichum* root rot, by R. B. Streets; relation of dosage to control of cotton seedling diseases by seed treatment, by R. Weindling; disease (*Colletotrichum graminicolum*(?)) threatening broom corn production in Illinois, by B. Koehler; parasitic fungi collected on certain forage legumes in the Pacific Northwest in 1941; by J. R Hardison; weather cycles and fruit diseases at Hood River, Oreg., by J. R. Kienholz; fruit diseases in Idaho in 1942, by E. C. Blodgett; and brief notes on soybean streak in Ohio, and powdery mildew of *Saintpaulia ionantha* Wendl.

No. 3–4.—Some diseases affecting cultivated guayule in the southwest during 1942, by J. T. Presley; fruit and vegetable diseases in Massachusetts in 1942 and prospects for 1943, by O. C. Boyd; plant diseases (peanut, cotton, snap bean, and spinach) and injuries in Arkansas in 1942, by V. H. Young; iron dimethyl dithiocarbamate, a possible substitute for bordeaux mixture for the control of apple blotch, by J. C. Dunegan; nut diseases (Persian walnut and filbert) in the Pacific Northwest in 1942, by P. W. Miller; grass diseases in Kentucky in 1942, by J. R. Hardison; notes on corn diseases in certain Southern States in 1942, by G. Y. Young; thinning *Crotalaria* stands in southeastern United States, by J. L. Weimer; investigations on seed treatment of forage grasses and legumes for control of damping-off, by K. W. Kreitlow; and brief notes on an unusual occurrence of root knot in central Iowa, downy mildew on onions in Texas, and ergot on Natal grass in Florida.

1942 disease information for the Middle Atlantic States, R. S. Kirby (*U. S. Dept. Agr., Bur. Plant Indus., Plant Disease Rptr., 1943, Sup. 140, pp. 51*).—This information on plant disease losses in 1942 and the practices found most effective for control was assembled by the Middle Atlantic States Section, American Phytopathological Society War Emergency Committee. The chairman included the diseases most important from the war standpoint from the material submitted by contributing plant pathologists from the agricultural experiment stations of the region. Diseases of cereal, forage, fruit, and truck crops and of tobacco, potato, and turf are considered.

Two items of pathological history from California, R. E. Smith. (Univ. Calif.) (*Phytopathology, 33 (1943), No. 3, pp. 258–260*).—References are given to early California agricultural literature recording the presence in that State of wheat bunt (*Tilletia tritici* or *T. levis*) and peach leaf curl (*Taphrina deformans*) as early as 1853 and 1852, respectively. Copper sulfate seed treatment for preventing bunt was general in California before 1860.

The use of fungicides during wartime, IV–VII, G. L. McNew. (N. Y. State Expt. Sta.). (*Canner, 96 (1943), Nos. 9, pp. 12–15, 24, illus. 2; 11, pp. 18–20, 70, 72, illus. 3; 12, pp. 14–16, 30, 32, 35, illus. 2; 13, pp. 16–19, 26, 28, illus. 3*).—In continuation of this series (E. S. R., 88, p. 770), four papers are presented:

IV. *Effect of weather conditions on response of sweet corn to different seed treatments.*—On the basis of experience with infected seed or soil and the 1942 experiments and commercial field tests, it is stated that even though seed treatment for corn is not so essential for securing suitable emergence as for peas or lima beans the treatments are undoubtedly profitable. There seems to be no justification for omitting them, since less than 3 ct. per acre for chemicals will increase the yield by several hundred pounds and any one of the well-established treatments can be depended upon. The promising newer materials (e. g., Thiosan and Spergon) should be tested in different localities in anticipation of the increasing scarcity of the metallic fungicides. The need for seed treatment is most acute when the seed germinate in cool wet soil; there is also a direct effect on the chemicals themselves, the copper compounds being most effective in cold wet soil and the mercury compounds under warmer conditions.

V. *Seed treatments for spinach.*—As a result of the 1942 tests, in which some of the newer fungicides were included, it is recommended as a step in improving the possibilities of seed treatments that canners encourage the growers to test Spergon and copper oxychloride-sulfate at 1.5 percent, Yellow Cuprocide at 0.5 percent, and Arasan at about 1 percent. In the meantime it is suggested that spinach seed for the main crop be given the standard treatments of zinc oxide (2–100 lb. of seed) or Red Cuprocide (2 percent) insofar as they are available.

VI. *Which varieties of peas need treatment?*—As a result of recent tests it is recommended that in case of shortages in other fungicides two new organic sulfur compounds, Arasan and Fermate, be used. Though not thoroughly tried out, they gave promise on the few varieties where applied. All wrinkled sweet varieties should be treated: Spergon (1.5 oz. per bushel) or Semesan (2.5 oz. plus 1 oz. graphite) can be used on all varieties. Red Cuprocide (2.5 oz. plus 1.25 oz. graphite) can be used on some. Alaska peas may be treated with Spergon (0.5–0.75 oz.), the only other suitable treatments for this variety being Semesan or 2 percent Ceresan, and these are not to be preferred.

VII. *Pea seed treatments as crop insurance.*—From the experience of the last 2 years' tests, it is recommended that, like any other insurance, pea seed should be treated every year, since it is impossible to judge when the weather will favor seed decay. Even the strongest seed may be destroyed, and no variety escapes injury under all conditions. The cost of treatment is small and there are two benefits, viz, prevention of stand failures and increased vigor and productivity, but there is no substitute for good seed.

Two zoophagous species of Acrostalagmus with multicellular Desmidiosporalike chlamydospores, C. Drechsler. (U. S. D. A.). (*Jour. Wash. Acad. Sci., 32 (1942), No. 11, pp. 343–350, illus. 2*).—*A. goniodes* n. sp. parasitizing nematodes and *A. tagenophorus* n. sp. destroying rotifers are described.

Tumor formation by attenuated crown-gall bacteria in the presence of growth-promoting substances, A. C. Braun and T. Laskaris (*Natl. Acad. Sci. Proc., 28 (1942), No. 11, pp. 468–477, illus. 3*).—It is shown that an attenuated culture of *Phytomonas tumefaciens* can form large tumors on tomato plants when supplemented with plant hormones or synthetic growth substances, apparently through nonspecific stimulation, though gross morphological appearances of the tumors varied with the substance used. By grafting tests it was further demonstrated that the cells of these tumors can be transplanted in series and subsequently develop into large tumors (up to 3–4 cm.) within 5 weeks. Since some of them appeared free of bacteria, and since it was shown that in those containing bacteria their degree of virulence had not been altered by the growth substances added, it is concluded that the attenuated culture, like the virulent one, was capable of changing the host cells to tumor cells, though the attenuated culture alone was unable to stimulate the altered cells appreciably. There would thus appear to be at least two distinct phases in tumor formation: (1) Change of normal cells to tumor cells; and (2) stimulation of the latter to continued multiplication by a growth substance, resulting finally in a tumor. Whether one or more substances are involved remains unknown, but certain possible answers to the question are presented. Once the altered cells are sufficiently stimulated, they appear to be capable of indefinite multiplication and tumor formation under favorable conditions without additional applications of growth substances. The altered cells then apparently continue to multiply autonomously and to retain, perhaps indefinitely, their tumor-inducing power.

A mucorine parasite on Penicillia, C. G. Dobbs (*Nature [London], 150 (1942), No. 3802, p. 319, illus. 1*).—A note on *Piptocephalis* parasitizing species of *Penicillium*, *Mucor*, and *Aspergillus*.

Another hyphomycetous fungus parasitic on Pythium oospores, C. Drechsler. (U. S. D. A.). (*Phytopathology, 33 (1943), No. 3, pp. 227–233, illus. 1*).—A delicate mucedinaceous fungus from Wisconsin leaf mold, described as *Trichothecium arrhenopum* n. sp., was found energetically parasitizing oospores of *P. graminicolum* in an agar culture. Like *Trinacrium subtile* and *Dactylella spermatophaga*, previously known as oospore parasites (E. S. R., 79, p. 63), it seems closely related to the series of predaceous hyphomycetes exemplified in *Arthrobotrys oligospora* rather than to the familiar *Trichothecium roseum*. It penetrates the oogonial envelope and the oospore wall by a massive crook-necked appressorium, somewhat resembling the antheridia of many Pythiums.

Der Einfluss verschiedener Bodenpilze auf die Virulenz von Rhizoctonia solani Kühn [Influence of various soil fungi on the virulence of R. solani], A. Jaarsveld (*Phytopathol. Ztschr., 14 (1942), No. 1, pp. 1–75, illus. 26*).—Following a review of the literature (77 references) dealing with the influence of antagonisms on the parasitism of soil-borne fungi, experimental data are presented indicating that *Absidia spinosa*, *Cladosporium herbarum*, *Cylindrocarpum didymum*, *Penicillium expansum*, *Pyronema confluens*, and two strains of *Trichoderma lignorum* possess a more or less strongly antagonistic action on the virulence of *R. solani* infection in *Brassica chinensis*. When two to four antagonistic soil fungi were combined with *R. solani* the total inhibitory effect was greater than when one antagonist alone was used. The effects of temperature on seed germination and seedling growth and on the fungi concerned were also studied. The antagonistic effects of *Absidia*, *Cylindrocarpum*, *Pyronema*, and *Trichoderma* (one strain) were strongest at temperatures optimum or very favorable to the development of these fungi. The antagonistically active factor was not bound to the living fungi, since the culture filtrate was antibacterial. When *Rhizoctonia* was inoculated into various dilutions of filtrate the strongest inhibitory effect was in the undiluted fitrate. In the highest dilutions many pseudosclerotia developed, in the weak dilutions a few, and in the undiluted filtrate none. The filtrates also had an antagonistic action on the pathogenicity of *Rhizoctonia* to the seedling plants. In combinations of the pathogen with the other three fungi in culture media the inhibitory action assumed various forms, but epiparasitism was never observed.

Antagonism and parasitism among some oomycetes associated with root rot, C. DRECHSLER. (U. S. D. A.). (*Jour. Wash. Acad. Sci., 33 (1943), No. 1, pp. 21–28, illus. 3*).—The author reports the occurrence of a more complicated system of biotic relationship among associated oomycetes than that of primary and secondary invaders. When, for example, *Pythium ultimum* and *P. oligandrum* both grow out from a piece of decaying pea root into a petri dish of corn meal-agar medium, the former is attacked by the latter in spectacular manner. *P. debaryanum* and *P. irregulare* are similarly attacked by *P. oligandrum*. Aquatic congeneric forms are subject to similar adverse action, as in the parasitic behavior of two other ecinulate species *P. acanthicum* and *P. periplocum*. The three species thus given to attacking other members of the genus are also distinguished by a delicate mycelial habit suited to envelopment of alien hyphae. Examples in other oomycete genera are presented. Furthermore, a capacity for inducing disease in higher plants can manifestly coexist with the ability to attack and injure other members of the same fungus group. There are 16 references.

Classification revision in Xanthomonas translucens, W. A. F. HAGBORG (*Canad. Jour. Res., 20 (1942), No. 5, Sect. C, pp. 312–326*).—The species description of *X. translucens* is emended to include five closely related bacteria distinguishable by pathogenic differences on wheat, oats, barley, and rye. Among them, *X. translucens* is given new rank as *X. translucens* f. sp. *hordei;* another, *Phytomonas translucens* f. sp. *undulosa*, is transferred to *Xanthomonas;* a third, *P. translucens secalis*, is given new rank and also transferred to *Xanthomonas* as *X. translucens* f. sp. *secalis;* the remaining two, *X. translucens* f. sp. *hordei-avenae* and *X. translucens* f. sp. *cerealis*, are described for the first time. The results of nondeterminative comparative physiological and serological studies of the second and last two of these special forms of *X. translucens* emend. show their close similarity in characters other than pathogenicity. Some variation among different isolates of the same special form was also found. Parallel studies on cultures of *Pseudomonas atrofaciens*, *P. coronafaciens*, and *P. medicaginis phaseolicola* were used as controls on the methods, which are described. There are 25 references.

Two new Canadian smuts, I. H. CROWELL (*Canad. Jour. Res., 20 (1942), No. 5, Sect. C, pp. 327–328, illus. 6*).—*Burrillia anomala* n. sp., forming irregularly elongated spots on leaves of *Sparganium diversifolium acaule*, and *Entyloma peninsulae* n. sp., forming linear sori on leaves of *Zizania aquatica*, are described.

Occurrence, identification, and species validity of the barley loose smuts, Ustilago nuda, U. nigra, and U. medians, V. F. TAPKE. (U. S. D. A.). (*Phytopathology, 33 (1943), No. 3, pp. 194–209, illus. 4*).—In a uniform chlamydospore germination test of 500 barley loose smut specimens from 33 States, 6 proved to be heterogeneous types, 192 produced the mycelial germination of *U. nuda*, 209 the sporidial germination of *U. nigra*, and 93 the mixture of mycelial and sporidial types described for *U. medians*. However, all of the last group proved to be simply mixtures of *U. nuda* and *U. nigra*. The more recently discovered seedling-infecting *U. nigra* apparently now causes as much of the barley loose smut in the United States as the well-known flower-infecting *U. nuda*. It is, therefore, now possible by simple, inexpensive seed treatments "to save half of the estimated loss from loose smut averaging 2 million bushels of barley annually." Chlamydospore germination studies of *U. nigra*, *U. hordei*, *U. avenae*, and *U. levis* at 5°–40° C. and on 10 different substrates proved conclusively that *U. nigra* is a true sporidium-forming smut like the other three. *U. nigra* is thus considered a valid species clearly distinguishable from the mycelium-forming *U. nuda*, and an amplified description is given. *U. medians* apparently was erroneously based on a mixture of two different smut fungi and must therefore be rejected. There are 36 references.

Reaction of strains and varieties of barley to many physiologic races of stem rust, F. R. Immer, J. J. Christensen, and W. Q. Loegering. (Minn. Expt. Sta. coop. U. S. D. A.). (*Phytopathology, 33 (1943), No. 3, pp. 253–254*).—The seedling reactions to 19 physiologic races of *Puccinia graminis tritici* and one collection of *P. graminis secalis* were tested on two varieties of barley normally susceptible and two varieties and twenty hybrids normally resistant in the field to stem rust. Seedlings of the latter group also proved resistant to all the physiologic races except No. 29, and those of the former group were susceptible to all races of *P. graminis tritici* but resistant to *P. graminis secalis*. Seedling reaction can thus be used to eliminate barley lines which are susceptible in the adult stage.

The effect of photoperiodism on the development of bunt in two spring wheats, H. A. Rodenhiser and J. W. Taylor. (U. S. D. A.). (*Phytopathology, 33 (1943), No. 3, pp. 240–244*).—The Canus and Ulka varieties, inoculated with three races of *Tilletia levis* and five of *T. tritici*, were grown under (1) natural daylight and (2) continuous light in a greenhouse at Arlington Experiment Farm, Arlington, Va. Under (1) Canus was resistant to all races, but under (2) there was a marked break-down in resistance to certain races but not to others. Ulka was fully susceptible to all but one race under both light conditions, and resistance to this was lowered by the long-day treatment. Differences in host vigor under the two light conditions were observed, but none of the changes could be correlated definitely with break-down of resistance. The highest percentages of bunt were obtained in the most rapidly growing plants. It is thus suggested that the fungus growth rate might have been conditioned by changes in the host nutrition induced by prolonged exposure to light.

Adult plant resistance in wheat to physiologic races of Puccinia triticina Erikss., M. Newton and T. Johnson (*Canad. Jour. Res., 21 (1943), No. 1, Sect. C, pp. 10–17*).—In studies of nine varieties, several proving susceptible to certain physiologic races at the seedling stage acquired a resistance to them with maturity. In the adult plant, resistance was greatest in the uppermost leaves, diminishing progressively downward. On the basis of rust reactions, the varieties tested fell into three groups: (1) Renown and Regent developed adult plant resistance to all 19 races tested. In these two varieties, and possibly in other Hope and H-44 derivatives, this reaction to leaf rust races may be a generalized phenomenon comparable to the resistance of such varieties to stem rust. (2) Thatcher, Apex, Marquis, Reward, and Kenya R. L. 1373 showed adult plant resistance only to certain races, a condition not hitherto encountered in other cereal rusts. (3) McMurachy and Warden × Hybrid each reacted somewhat similarly in the seedling and heading stages, the first being susceptible and the second resistant in both stages.

Studies on foot and root rot of wheat.—VII, Some factors affecting the health of wheat seedlings in nutrient solutions, L. E. Tyner and W. C. Broadfoot (*Canad. Jour. Res., 21 (1943), No. 1, Sect. C, pp. 18–25*).—Previous work (E. S. R., 80, p. 207) having suggested the need of further studies, the effect of iron tartrate on chlorosis development in wheat seedlings in nutrient solutions and also the effects of extracts of *Helminthosporium sativum* and *Fusarium culmorum* on disease expression were investigated in the greenhouse. The tartrate proved effective in preventing chlorosis. Less iron was required in summer than in winter plantings and less in solutions at the higher H-ion concentrations. Under the test conditions, Mn effected no amelioration of chlorotic symptoms in the presence of Fe deficiency. Sterilized and nonsterilized filtered extracts of the above fungi added to crocks of nutrient solution inhibited wheat seedling growth, an effect of soil culture interpreted as an index of pathogenicity.

Further studies of osmotic and permeability relations in parasitism, F. S. Thatcher (*Canad. Jour. Res., 20 (1942), No. 5, Sect. C, pp. 283–311, illus. 11*).—In continuation (E. S. R., 81, p. 796), fungus-induced changes in host cell permeability were studied by plasmolytic methods. Race 21 of *Puccinia graminis tritici* caused an increase in permeability to cells of the susceptible Little Club and Mindum wheat varieties, whereas resistance of the latter to race 36 was associated with a local decrease in permeability. Norcotization of Mindum wheat increased the permeability and rendered this variety more susceptible to race 36. This information, together with a hypothesis previously expounded to explain mechanisms involved in food uptake by rust fungi, was used to formulate a theory illustrating a basic component of the factors responsible for rust resistance. This theory appears to interrelate the two main contrasting theories hitherto propounded.

Permeability increase was also demonstrated as an effect of tissue invasion by *Botrytis cinerea*, *Sclerotinia sclerotiorum*, and *Phytophthora infestans*. This fact is allied with other data to explain the characteristic symptoms associated with the diseases induced by these fungi and to propose an accessory role of permeability increase in their parasitism. The probable cause of wilting by hadromycotic fungi is discussed, and the role of a permeability increase demonstrated for leaf cells of tomato acted on by *Fusarium lycopersici* culture filtrate is also considered in this connection. The decrease in permeability found in tissues of a swede root near the margin of a *Phoma lingam* lesion is interpreted as a change in accord with the suggestion that a dry rot is determined by the ability of the host to restrict the amount of water reaching the parasite and so to arrest the progress of its enzyme activity at some intermediate stage. There are 39 references.

Seedling blight and root rot of grasses in Minnesota, H. A. Andrews. (Minn. Expt. Sta.). (*Phytopathology, 33 (1943), No. 3, pp. 234–239*).—*Helminthosporium sativum* and *Pythium graminicolum* proved to be most pathogenic among the fungi isolated from diseased roots of various grass species grown at St. Paul. Sown in soil containing these two fungi, seed of *Agropyron cristatum* and *Bromus inermis* produced only a few plants with tendency to stunting, the principal injury being a preemergence killing of the seedlings. In greenhouse tests the stands of *A. cristatum* and *B. inermis* in steamed soil inoculated with *P. graminicolum* were similar at soil temperatures of 12.3°–31.5° C. *A. pauciflorum* and *A. smithii* were relatively resistant to *P. graminicolum* in a greenhouse test in which *A. cristatum*, *Andropogon furcatus*, *A. scoparius*, *Bouteloua curti-*

pendula, *B. gracilis*, *Buchloë dactyloides*, *Elymus canadensis*, *E. junceus*, *Oryzopsis hymenoides*, *Panicum virgatum*, *Poa ampla*, and *Stipa viridula* were severely injured. Isolations from seeds of 11 grass species yielded *Alternaria*, *Fusarium*, and *Helminthosporium* along with other fungi and bacteria. Surface sterilization of the seeds with $HgCl_2$ did not improve the stand or the subsequent development of the plants in the greenhouse.

Die Rostpilze der wichtigsten zur Samengewinnung angebauten Futtergräser [The rust fungi of the most important fodder grasses grown for seed production], E. Mühle (*Phytopathol. Ztschr., 14 (1942), No. 1, pp. 83–101*).—This is a review (82 references) and general account, with tabulated list of grass species and the Puccinias reported for each.

Variability of Nigrospora on maize, J. H. Standen. (Iowa Expt. Sta.). (*Iowa State Col. Jour. Sci., 17 (1943), No. 2, pp. 263–275, illus. 1*).—The fungus as it occurred on corn in Iowa (1938–41) exhibited wide variability both on the host and in pure culture. Isolates from collections with large spores tended to produce smaller spores in culture than on the host and varied more in mycelial color and average spore diameter than those from collections with small spores. The latter tended to produce slightly larger spores in culture than on the host. Locality of collection appeared to have no relation to spore size. There was a marked tendency for single-spore isolates, originating from large spores, to produce spores characteristic of *N. oryzae* in size. The average diameter of spores tended to become fairly uniform in culture, especially in single-spore isolates, but the isolates were extremely variable as to color and appearance of mycelium and rapidity and abundance of sporulation. Both white and gray "strains" were obtained as single-spore isolates from a single-spore culture. Four isolates grown on a series of media varied in their responses thereto. Observations over 4 yr. relating to cob maturity and variation in disease symptoms afforded no evidence of the presence of large- and small-spore species. Spore measurements of *Nigrospora* from other hosts apparently indicated the variability to be no greater than that on corn. Based on the data obtained, the Iowa collections are all referred to as *N. oryzae*.

Delinting and treating cotton seed in Georgia, 1938–1941, U. R. Gore (*Georgia Sta. Cir. 141 (1943), pp. 18, illus. 2*).—Anthracnose-infested seed averaged an increase of 159 lb. of seed cotton to the acre from Ceresan treatment. Machine delinting or reginning gave an increase of 167 lb. and reginning plus the chemical treatment an average increase of 250 lb. of seed cotton to the acre over the fuzzy, untreated seed. Planting of about 1 bu. of reginned seed per acre is recommended. Either New Improved Ceresan or Ceresan proved effective dusts for cottonseed, which may be treated at any convenient time and stored in a dry place until planted. It is good insurance any season to treat with organic mercury dusts. Being poisonous, treated seed should not be fed to stock or sold for oil. Seed heated in storage or damaged seed of low vitality should not be planted. Ample planting seed should be saved, since 2-year-old seed is practically disease-free and seed will be available should replanting be necessary.

Pea diseases in Wisconsin in 1942, J. C. Walker and W. W. Hare (*Wisconsin Sta. Res. Bul. 145 (1943), pp. 32, illus. 16*).—The 1924 pea disease survey (E. S. R., 54, p. 248) led to recognition of *Fusarium* wilt (*F. oxysporum* f. *pisi* race 1); in this survey covering 4,714 acres in 654 fields not a single case was observed, showing the completeness with which resistant varieties have now eliminated this formerly destructive disease. Common root rot (*Aphanomyces euteiches*) found favorable conditions in both years and was of prime importance. Near-wilt (*F. oxysporum* f. *pisi* race 2), which has gradually increased in importance, was probably suppressed somewhat by the cool season of 1942. Perhaps the most alarming aspect was the general increase in *Ascochyta* blight, anthracnose, bacterial blight, and the virus mosaic and streak diseases which is not entirely explainable through climatic conditions. The survey proved that *Ascochyta* blight, anthracnose, and bacterial blight were widely introduced on western-grown seed. Thus a certification system for pea seed may become necessary. It was also conclusively shown that definite culture practices are equally as important as clean seed. With the demand for increased acreages in 1942 the average rotation period between pea crops was decreased—an important factor in relation to the major soil-borne diseases. Field selection with respect to drainage is stressed, since root rot is favored by moist soils. It is thus clear that there is no simple treatment or panacea, but that control must rest on resistant varieties, clean seed, and proper management practices. There are 50 references.

Clean seed, crop rotation prevent Ascochyta blight, W. C. Snyder. (Univ. Calif.). (*West. Canner and Packer, 35 (1943), No. 3, pp. 18–20, illus. 1*).—The fungus blights of peas, and especially those due to three species of *Ascochyta*, are major hazards during the rainy spring months, and particularly along the Pacific coast from Canada to the Mexican border. The author discusses these diseases primarily from the standpoints of canners and freezers of green peas and of others who use peas in the green or dry pod stages, outlining methods of control through clean seed, rotation, and sanitation.

Potatoes (*Maine Sta. Bul. 411–C (1942), pp. 281–317, 327–343, illus. 6*).—Reports of progress are presented on work with various potato diseases, including bacterial ring rot control through resistant varieties, clean seed, disinfectants, and destruction of infected tubers; leaf roll (net necrosis) control by resistant varieties, certified seed programs, and by insecticidal control of the aphid vector, and various factors influencing this virus disease; stem-end browning and its relations to culture practices and fertilization; purple top; *Rhizoctonia;* mahogany browning, a low temperature injury; late blight and its fungicidal control; and the value of various fungicide and insecticide combinations. Also discussed are green manure crops and fertilizers for potatoes, seed tuber spacing, potato varieties, and potato byproducts (noted on p. 24). An appendix presents tabulated data on the various studies above noted.

Seed potato improvement and large volume production through a four-year-five-phase cycle, C. W. Clemmer and K. Koch (*Amer. Potato Jour., 20 (1943), No. 2, pp. 33–36, illus. 1*).—This program, in operation for virus disease control in the eastern United States, is outlined and illustrated by a chart.

Stem-end vascular discoloration of potatoes due to Fusarium oxysporum f. tuberosi, E. J. Peters (*Amer. Potato Jour., 20 (1943), No. 1, pp. 10–12*).—Of 426 tubers selected for stem-end discolorations, 380 were definitely infected with this fungus and 28 doubtful cases were also so identified by W. C. Snyder. Nearly 60 percent of the potatoes grown from the 380 infected tubers would not pass U. S. Grade specifications, though practically all those from clean seed did so. Of 696 tubers from infected seed all yielded the fungus on culture; those from clean seed were sterile.

Potato seedling and variety test for scab resistance on college muck, 1941, E. J. Wheeler (*Mich. Muck Farmers Assoc. Proc., 24 (1942), pp. 18–20*).—The test briefly reported indicates that it would not be impossible eventually to breed potato varieties resistant to scab.

Virus leaf roll resistance in the potato, F. J. Stevenson, D. Folsom, and T. P. Dykstra. (U. S. D. A. and Maine Expt. Sta.). (*Amer. Potato Jour., 20 (1943), No. 1, pp. 1–10*).—Leaf roll has become a serious menace in some of the best potato sections of the United States and, no satisfactory control methods for the aphid vector being known, the breeding of resistant varieties has assumed first importance. As here used, resistance to leaf roll is the ability to escape infection for a longer time than Green Mountain or Chippewa. Experience indicated field-exposure tests to be most practical for demonstrating differences in resistance, and such work was carried out in Maryland and at two stations in Maine, including varieties from the United States, South America, and Europe. All but one of the last group became infected to a certain degree. A number of progenies related to Katahdin all exhibited a much higher resistance than Green Mountain, but on repeated exposure they became infected. Of 55 progenies consisting of 5,518 seedlings tested over 5 yr. (1938–42), 300 showed no leaf roll in 1942. Breeding for resistance to net necrosis was not undertaken, but a number of the new varieties, Katahdin, Chippewa, and Sebago, very seldom if ever contract this malady.

The effect of sorghum kernel smuts on the development of the host, L. E. Melchers and E. D. Hansing. (Kans. Expt. Sta.). (*Jour. Agr. Res.* [*U. S.*], *66* (*1943*), *No. 4, pp. 145–165, illus. 7*).—In a study of 25 sorghum varieties, selections, and hybrids with respect to *Sphacelotheca sorghi* and *S. cruenta*, marked differences in effects of the two smuts on the development of the host were shown, as well as great variation among sorghum varieties. Infection with *S. cruenta* physiologic races 1 or 2 caused reductions in height of plant, stalk diameter, and leaf width; infection with *S. sorghi* reduced primarily the stalk diameter and leaf width. The most important factor responsible for reduction in height of infected plants was the decrease in number of internodes, and a histologic explanation is offered. The growth cycle of plants infected with *S. cruenta* was speeded up, but plants infected with *S. sorghi* headed at about the normal time. Varieties infected with *S. cruenta* averaged more tillers than those attacked by *S. sorghi*. Plants infected with races 1 or 2 of *S. cruenta* varied in the degree of proliferation and abnormal dark green color of the glumes—deformities not occurring in those infected by *S. sorghi*. Milo and milo hybrids infected with either of these smuts lacked the awn development characteristic of normal florets in this sorghum group.

The zonate leaf spot, a new disease of sorghum, D. C. Bain and C. W. Edgerton. (La. State Univ.). (*Phytopathology, 33* (*1943*), *No. 3, pp. 220–226, illus. 2*).—The new leaf spot described is shown to be due to *Gloeocercospora sorghi* n. gen. and sp. This disease of sorghum and other gramineous hosts enters the leaf through the stomata. It is reported to be very common in Louisiana and also to occur in other States. *Titaeospora andropogonis* is also reported for Louisiana.

Chemicals effective for sweet potato "seed" treatment, H. T. Cook and L. L. Harter (*Virginia Truck Sta. Bul. 109* (*1942*), *pp. 1797–1807*).—From the results of several years' work with a number of chemicals and commercial preparations for controlling black rot, it is concluded that boric acid, borax, or lime-sulfur make satisfactory substitutes for $HgCl_2$, now scarce and high in cost. Borax is cheaper than boric acid, easily obtainable, and noncorrosive to metals and relatively innocuous to animals. A 2.5 percent solution of borax may be used, the seed sweetpotatoes to be immersed in it for 10 min. and then bedded immediately. The solution may be used repeatedly, adding more when insufficient is left to cover the roots well.

New treatment for seed sweetpotato found satisfactory, J. A. Pinckard and W. S. Anderson (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 2, p. 7*).—Results of tests reported indicate that Semesan Bel may be safely substituted for $HgCl_2$ as a seed piece disinfectant against the two most important sweetpotato diseases—black rot and stem rot. Spergon paste, or wettable

Spergon, proved unsatisfactory for this purpose though effective for certain other crops.

The physical and chemical properties of a distinctive strain of tobacco mosaic virus, C. A. KNIGHT (*Jour. Biol. Chem.*, *145* (*1942*), *No. 1, pp. 11–18*).—This virus strain, originally discovered in ribgrass (plantain), was isolated from diseased Turkish tobacoo and highly purified by differential centrifugation. Like ordinary tobacco mosaic virus, it could be obtained as needlelike paracrystals. Elementary and carbohydrate analyses gave values similar to those obtained with ultracentrifugally prepared tobacco mosaic virus with one exception. The ribgrass virus contained about 0.64 percent S as compared to only 0.2 percent S reported for ordinary tobacco mosaic virus. Nucleic acid was separated from the protein component and found to be of the ribonucleic acid type. Solutions of the virus were doubly refracting and examination in the analytical ultracentrifuge and by the electron microscope indicated the presence of rodlike particles appearing indistinguishable in size and shape from those of common tobacco mosaic virus. Little difference appeared between the ultraviolet absorption curves of tobacco mosaic and ribgrass viruses and of their protein and nucleic acid components. However, a significant difference between the two viruses was apparent in the band structure as obtained with the continuous light of the hydrogen discharge tube, particularly in the tyrosine-tryptophane region. Serological tests indicated that the two viruses contain common antigenic groups but, in addition, that each possesses distinctive groups lacking in the other. There are 20 references.

Respiration of mosaic-infected tobacco plants, F. L. WYND. (Univ. Ill.). (*Plant Physiol.*, *18* (*1943*), *No. 1, pp. 90–98, illus. 1*).—The rate of O_2 use by leaves from mosaicked plants was greatly increased by the fourth day after inoculation of a lower leaf, this stimulation period usually preceding by about 10 days the general appearance of virus in infectious concentration. Though the disturbed metabolism indicated by the increased rate of O_2 use took place simultaneously throughout the plant, the appearance of infectious concentrations of new virus material occurred first in the upper leaves (inoculated leaf excepted), which had a higher initial rate of metabolism. By the time infectious concentrations appeared in the upper leaves, the rates of O_2 use by these leaves were always less than that of normal leaves. Since infectious material appeared only after a disturbed metabolism, it is deemed probable that the observed metabolic changes were cellular in nature and not dependent on any metabolic activity of the virus material. There are 21 references.

An outbreak of Plantago virus in Burley tobacco, W. D. VALLEAU and E. M. JOHNSON. (Ky. Expt. Sta.). (*Phytopathology*, *33* (*1943*), *No. 3, pp. 210–219, illus. 2*).—This virus is reported to be common in *Plantago* sp. around Lexington, Ky. An outbreak of a necrotic disease of Burley tobacco proved due to the plantago virus in a variety carrying the N′ factor and responding with the necrotic reaction. In other varieties with n′ factor the virus caused a mottle disease. In tobacco varieties with the N factor from *Nicotiana glutinosa* the plantago virus and the tobacco mosaic virus cause similar necrotic reactions, but in hybrids containing both N and N′ factors the plantago virus produces few minute necrotic spots, whereas tobacco mosaic virus causes the usual necrotic reaction. Tomato plants, if heavily inoculated, develop faint mottle and mild streak. It is suggested that the plantago virus may have antedated the origin of *N. tabacum*, and the numerous field strains of tobacco mosaic virus may have derived from the plantago virus.

Tetramethyl thiuramdisulfide as a vegetable seed treatment, G. F. MILES (*Agr. News Letter*, *11* (*1943*), *No. 2, pp. 33–34*).—In tests on 11 different vegetables against pre- and post-emergence damping-off by *Rhizoctonia* and *Pythium*, seed treated with Arasan (trade name for tetramethyl thiuramdisulfide combined with a suitable adjuvant) gave an average final stand of seedlings 24.4 percent better than for untreated seed. In the same test the increases for the metallic seed treatments were 4.3–12.3 percent better than the controls.

New seed protectants (*New Jersey Stas. Plant Disease Notes, 20 (1942), No. 8, pp. 31–34*).—The results of the past year's seed treatment tests with Thiosan, Tuads, and Spergon on 10 different vegetables are presented. The first two gave good protection of all seed types with no evidence of injury; results with Spergon varied considerably with kind of seed used.

Zur Frage der Verwendung kupferhaltiger Spritzmittel im Kampf gegen den Spargelrost [The question as to the use of copper sprays against asparagus rust], K. Hassebrauk (*Phytopathol. Ztschr., 14 (1942), No. 1, pp. 76–82*).—A comparison of the author's results with findings by others (10 references).

Boron deficiency in garden and sugar beet, J. C. Walker, J. P. Jolivette, and J. G. McLean. (Wis. Expt. Sta.). (*Jour. Agr. Res.* [*U. S.*], *66 (1943), No. 3, pp. 97–123, illus. 6*).—On young garden beet seedlings in quartz-sand culture, B deficiency appeared promptly as an intensification of red pigment, unilateral development of leaf blade, stunting, and death of the growing point. B became fixed promptly in the tissues, so that mature leaves did not yield mobile B readily to meristematic regions though soluble B in the nutrient solution was transported to and used by the growing tip. When B was eliminated after taproot enlargement, typical black spot appeared gradually in rings of the most recently differentiated bundles. Greenhouse diagnosis of B deficiency by pot tests was not satisfactory. In surveys (1937–40) in Wisconsin, internal black spot of garden beet was found most often in neutral or alkaline soils, and in field tests (1938–41) borax applied to the soil reduced this trouble in garden beet and heart rot of sugar beet whereas other minor elements did not. The sugar beet deficiency was effectively corrected with less borax than that of garden beet. Increases in yield of garden beet commonly resulted from use of borax, and the canning quality was not affected by applications up to 100 lb. per acre. Soil types differed in the degree to which available B was tied up by liming, and in sandy soil B deficiency was made acute by liming without the soil solution approaching an alkaline reaction and for 5 yr. after treatment. Detailed results with respect to amounts and methods of application are given. There are 26 references.

Effect of boron deficiency on the histology of garden beet and cabbage, J. P. Jolivette and J. C. Walker. (Wis. Expt. Sta.). (*Jour. Agr. Res.* [*U. S.*], *66 (1943), No. 4, pp. 167–182, illus. 10*).—In young seedling beet roots and hypocotyls in sand culture or field, the first sign of deficiency is in the contents of certain phloem cells and occasional hypertrophy of cambial cells. In slightly older plants degeneration appears in primary and secondary xylem as intercellular brown deposits, accompanied by cell distortion. Groups of disintegrated cells are frequently surrounded by a border of proliferating cells which may involve one or more bundles, and in roots which are somewhat older when the deficiency becomes acute, the severest necrosis occurs in the most actively differentiating tertiary ring or rings. Abnormal development in beet leaves centers in the petiole bundles, and cell enlargement and proliferation extend to the mesophyll and spongy parenchyma of the blade. In the floral axis proliferation occurs in the cambium and pith. Necrotic areas occur in the pith and in the vascular region of secondary and tertiary rings and are sometimes connected with similar regions in the cortex.

In young cabbage plants extensive proliferation of cells in the cambium region of root, hypocotyl, and stem results in a band of meristematic tissue several times the usual width of the undifferentiated zone between phloem and xylem, with correspondingly less differentiation of vascular elements. Necrotic areas develop in this undifferentiated area, and abnormalities are occasionally seen in the stem apex cortex, but necrosis in the pith is rare until the plant has approached the head stage. Deficiency symptoms in the field are usually confined to this region. In the leaves, disturbances in differentiation of the vascular bundles in petioles and blades are the chief evidences of disease.

In both species boron shortage appears to affect chiefly the metabolic processes concerned in cell division, cell differentiation, and possibly storage. The initial reaction is seen in discoloration of cell wall and contents, excessive cell division, and abnormal enlargement. The later necrotic areas are made up of disintegrated cells often surrounded by hyperplastic, hypertrophied, and sometimes peculiarly differentiated cells. Extensive histological changes occur before macroscopic symptoms appear. There are 33 references.

Control of eggplant yellows, S. E. Jones (*Texas Sta. Bul. 623* (*1942*), *pp. 17, illus. 2*).—In control studies involving 9,092 plants on 54 field plats (1934–39), sulfur, sulfur-pyrethrum, sulfur-cube, fuller's earth-cube, and hydrated lime dusts were all effective in controlling this virus (probably) disease when applied before infection, but straight dusting sulfur gave the most economical results. Practical control was obtained when the plants were kept lightly covered with dusts containing sulfur throughout the time they were in the seedbed, with no treatment after transplanting, and almost perfect results followed dusting in both seedbed and field. Soil applications of sulfur at 500 lb. per acre resulted in 10 percent infection as compared with over 49 in the untreated. The most economical control found consisted in keeping the seedbed lightly covered with sulfur dust. Plants in the seedbed grown under a wire screen for insect protection had about half as much infection as the uncovered controls. Previous work, the symptoms induced, and the distribution of this disease are briefly considered.

The role of packing methods in the increase of anthracnose of honeydew melon fruits, W. A. Kreutzer and D. P. Glick. (Colo. Expt. Sta.). (*Phytopathology, 33* (*1943*), *No. 3*, *pp. 245–248*).—Preliminary studies on the increase in *Colletotrichum lagenarium* infection of honeydew melons after harvest indicated methods used by shippers to be at fault, since washing of both diseased and healthy specimens in a common tank, coupled with rough handling, appeared to be responsible for most of the anthracnose developed after packing. When as few as four infected melons were gently rinsed in 4 l. of water and apparently healthy melons with artificially induced injuries and bruises were then rinsed therein, anthracnose developed only at the spots where these melons had been injured. Five-minute treatments in a chlorine solution containing 120 p. p. m. proved adequate for inactivating the spores. However, concentrations as high as 1,000 p. p. m. failed to inactivate all the conidia in active lesions. Five-minute treatments at as high a concentration as 10,000 p. p. m. did not injure honeydew melons.

Onion downy mildew, C. E. Yarwood (*Hilgardia* [*California Sta.*], *14* (*1943*), *No. 11*, *pp. 595–691*, *illus. 13*).—In this monographic study of *Peronospora destructor* (87 references), detailed consideration is given to such matters as its history, description, taxonomy, life history, culture and inoculation trials, hosts (9 *Allium* spp.) and varietal resistance, overwintering, transmission, and associated fungi, as well as to the symptoms, economic importance, epidemiology, and control of the disease induced by it. Its effects are said to be most severe on the seed crop—a highly important industry in California—losses up to 70 percent for the State and 100 percent for individual fields having been sustained. Under local conditions the principal seasonal carry-over appears to be via mycelium in the bulbs, though the amount of such transfer is small. Sporangia are normally formed at night, matured in the early morning, and liberated throughout the day, sporangiophore formation being governed by the alternation of light and darkness in the normal day as well as the relative humidity. Attached to the sporangiophores on living leaves, the sporangia live for about 3 days; detached on healthy leaves, for about 1 day. Germination occurs in the presence of free water and entry is through the stomata. The most important epidemiological factors in determining severity of attack are inoculum, temperature, moisture, and wind. Attack may be severe in the absence of rain. Mycelium in infected bulbs was killed by heating for 4 hr. at 41° C.; in leaves, for 10 hr. at 37°. The action of fungicides (sulfur and copper) was studied by several methods described. Certain spray supplements increasing the wetting power on the leaves, and addition of vegetable oils to several Cu sprays, enhanced their protective value. In all field tests on which mildew was severe in untreated plats, spraying with various fungicides reduced the incidence and increased yields by 60–5,700 percent in different tests. Rosin lime-sulfur was perhaps the best mixture tried. Concentrated sprays in the form of vapor dusts gave marked control, but dry dusts were valueless.

The pink root disease of onions, A. L. Andersen (*Mich. Muck Farmers Assoc. Proc., 24 (1942), pp. 20–22*).—A brief outline of work in Michigan on this important disease due to *Phoma terrestris*. The most feasible method of control lies in the production of resistant varieties, but since the outlook for immediate benefits along this line are not promising, crop rotations appear to be the best interim method.

Progress in the control of peppermint wilt by resistance, R. Nelson (*Mich. Muck Farmers Assoc. Proc., 24 (1942), pp. 38, 40, 42*).—Note with special reference to breeding for resistance to *Verticillium* wilt.

Preliminary results on the control of tomato anthracnose, J. D. Wilson (*Ohio Sta. Bimo. Bul. 220 (1943), pp. 34–37, illus. 1*).—In a test of Basicop, Cuprocide, Copper A, bordeaux, and Fermate, the last gave the lowest percentage of ripe fruits showing *Colletotrichum phomoides* infection, with bordeaux a close second. Fermate thus shows considerable promise for anthracnose but is said to be less efficient than some of the copper fungicides against defoliation by *Alternaria* and *Septoria*. Further work must indicate how it may fit into the general control schedule.

Increase of pathogenicity in tomato-wilt Fusarium, F. L Wellman. (U. S. D. A.). (*Phytopathology, 33 (1943), No. 3, pp. 175–193, illus. 2*).—By far the greatest proportion of agar culture saltations of *F. bulbigenum lycopersici* exhibited less virulence than the parent cultures, only about one sector in a thousand from mild cultures being of higher pathogenicity. The thermal death point of conidia from a virulent form was about 60° C.; from a mild form about 50°. With cultures 2–2.5 yr. old, more conidia germinated from virulent than from mild isolates. Cultures from surviving conidia from old cultures of mild types were largely of higher pathogenicity than where the conidia had not aged. The mild forms grew faster on agar than the virulent ones, but in liquid media the virulent predominated. Susceptible hosts were ordinarily invaded by the mild form only up to the cotyledonary node. However, when mild and virulent forms were simultaneously inoculated, the mild proceeded parallel with the virulent invader into the upper parts of the plant, but the virulent form developed more extensively. In resistant hosts the mild isolates were more confined to the basal portions of the plant, even with a mixed infection, and the virulent forms were commonly precedent over the mild as they extended up towards the plant apex. The value of using a virus strain of known high virulence in testing for resistance is stressed.

A new parasite of tomatoes, G. H. Starr. (Wyo. Expt. Sta.). (*Phytopathology, 33 (1943), No. 3, pp. 257–258, illus. 1*).—Broomrape (*Orobanche ludoviciana*) is reported as parasitizing tomato plants of the 10-ton Rutger variety near Casper, Wyo. (1942). Of 700 plants, 50 were infected, with stunting and corresponding light yields. This parasite is commonly found on sagebrush and other perennials, but not on annual plants such as tomatoes.

A disease of apple grafts and layers caused by a Rhizoctonia, J. S. Cooley and F. B. Lincoln. (U. S. D. A. and Univ. Md.). (*Phytopathology, 33 (1943), No. 3, pp. 255–257, illus. 1*).—The authors describe a disease, found due to *R. solani*, which induced either lesions or girdling at or below the soil line on apple grafts planted deep to produce own-rooted plants, as well as on apple-layer shoots.

Comments on sooty blotch and blue mold of apple (*New Jersey Stas. Plant Disease Notes, 20 (1942), No. 9, pp. 35–38*).—Tests in 1942 would seem to indicate that the regular fruit spot sprays, or a lead-lime codling moth schedule during the early cover sprays, will give adequate sooty blotch (*Gloeodes pomigena*) control in southern New Jersey. Factors involved in the recent abundance of blue mold (*Penicillium*) decay of apples in common storage are discussed.

The storage disorders in some apple varieties, W. E. Isaac (*Farming in So. Africa, 17 (1942), No. 201, pp. 775–780, 806, illus. 5*).—In 4-yr. tests of nine apple varieties, fungus wastage was reduced by storing at the lowest temperature compatible with the minimum development of functional disorders. The superficial scalds were in most cases eliminated or reduced by storage at suitable temperatures and use of oiled wrappers. Of the varieties tested—Golden Delicious, White Winter Pearmain, York Imperial, Winter Red, Granny Smith, Ohenimuri, Red Delicious, Wemmershoek, and Rome Beauty—all but the last fell into one or another of the two optimum storage-temperature groups, which are based essentially on the levels at which superficial scald develops. In the absence of scald the apples are best stored at the lower temperature. Except for Golden Delicious and York Imperial, oiled wrappers are recommended. Of the two main temperature groups, Granny Smith, Red Delicious, and Wemmershoek are best stored at 35°–36° F.; the others at 32°.

The rosette mosaic disease of peach, D. Cation (*Michigan Sta. Tech. Bul. 180 (1942), pp. 24, illus. 5*).—Though present in Michigan for 25 yr. or more, rosette mosaic has, so far as known, been confined to relatively few orchards and has not spread to any large extent within the last 10 yr., but it has persisted on particular orchard sites despite removal of diseased trees. Transplants to the sites from which diseased trees had been removed frequently showed symptoms of the disease the second year after planting. Experimentally, trees were successfully inoculated by bud grafting or by placing nonsterilized soil from a disease site around the roots. Two forms were observed, viz, a less severe one with an incubation period of 1 yr. or more and a severe form thus far manifesting symptoms the year after budding inoculations. However, on one young tree bud-inoculated near the ground as the tree was breaking dormancy the symptoms appeared in 3 weeks. The disease was shown to be carried on one Damson plum in particular, and there were strong indications that it was present in other Damson and Burbank plums and prunes of undetermined variety. Symptoms were not apparent on Abundance and Red June plums 2 yr. after inoculation. In some instances the trees have reacted most severely the year after budding, with fewer indications during the second year, this being especially noticeable on one unnamed variety which exhibited indications of resistance. Differences in varietal susceptibility were evident on peach, South Haven appearing the most susceptible of those tested. Rosette mosaic shows distinct dissimilarities to peach rosette, phony peach, peach mosaic, and cherry yellows—the four diseases which it perhaps most closely approaches in symptom reactions.

Anthracnose of red raspberries, E. G. SHARVELLE (*Minn. Univ. Agr. Ext. Folder 113 (1942), pp. [6], illus. 4*).

Relation of injury and death of small roots to decline and collapse of citrus and avocado, L. J. KLOTZ and V. P. SOKOLOFF (*Citrus Leaves, 23 (1943), No. 1, pp. 1–3, 22, illus. 7*).—A wilt and collapse of these trees similar to that in orchards was found experimentally associated with nitrate injury to the roots, with a consequent difficulty in absorbing water from the soil or water cultures. The injured roots proved susceptible to attacks by *Phytophthora* spp. and still weaker parasites, in the absence of which the roots tended to recover on transfer to nitrite-free media, even without aeration. Certain soil-building practices may prove conducive to nitrite production in orchards.

Some fungal infections of citrus in relation to nutrition, H. D. CHAPMAN and S. M. BROWN. (Calif. Citrus Expt. Sta.). (*Soil Sci., 54 (1942), No. 4, pp. 303–312, illus. 4*).—Navel and Valencia orange trees (4-year-old) on sour orange stocks growing out of doors in high-K-low-Ca solution cultures became infected with brown rot gummosis. Under similar conditions, but with more favorable K : Ca ratios, none of the symptoms developed, though it was possible to isolate *Phytophthora parasitica* from the roots. Fruits on the nutritionally unbalanced navel orange trees showed some water spot disease on the rinds, and a considerable number of fruits became infected with *Alternaria citri*. In a somewhat similar outdoor solution-culture test with navel oranges on sour stock, the roots in cultures receiving medium- and high-phosphate levels (1.5–5 milligram equivalents per liter) became seriously attacked by *Thielavia basicola*. The low-phosphate trees (slightly P-deficient) were much less seriously affected. The reaction of all of these cultures had been maintained near pH 5. Increasing the acidity to pH 3.5 in two of the high-phosphate cultures markedly checked *T. basicola*, and the roots subsequently developing showed no symptoms of reinfection. These observations may have some practical significance in relation to citrus disorders in California, since phosphate and K have accumulated markedly in the soils of many old citrus orchards as a result of the continued use of manures and mixed fertilizers. There are 21 references.

Studies on the witches' broom disease of cacao caused by Marasmius perniciosus Stahel.—I, Introduction, symptoms, and etiology, R. E. D. BAKER and S. H. CROWDY (*Imp. Col. Trop. Agr. [Trinidad], Dept. Mycol. and Bact. Mem. 7 (1943), pp. 28+, illus. 28*).

Aster wilt is reduced, P. E. TILFORD. (Ohio Expt. Sta.). (*South. Florist and Nurseryman, 54 (1943), No. 23, p. 7*).—This is a progress report on work of 1940–43, having to do largely with inoculations of different strains of the fungus, and a search for resistant varieties certain of which show much promise.

A ring spot disease of gladiolus corms, C. D. MCKEEN (*Canad. Jour. Res., 21 (1943), No. 1, Sect. C, pp. 1–9, illus. 2*).—Confined to the corm and manifested only in storage, ring spot is characterized by rather superficial reddish-brown lesions walled off by a periderm layer and bearing somewhat conspicuous concentric rings originating at the nodes and around root initials. Progeny of affected corms were almost invariably diseased, ring spots developing about 2.5

mo. after harvesting. Varying the storage temperatures and relative humidities failed to affect the nature or development of symptoms appreciably. *Penicillium* and *Fusarium* were infrequently isolated, inoculations giving negative results. The cause is as yet not established. Disinfecting the corms failed to control the disease.

For gladiolus rot, scab, D. B. Creager. (Ill. Nat. Hist. Survey). (*South. Florist and Nurseryman, 54 (1943), No. 24, p. 6*).—Based on 3 years' experimental results, cresol solution compound (USP XI) is recommended as a general treatment for gladiolus bulbs just before planting to prevent bacterial scab and *Fusarium* rot and probably also to kill thrips.

The case of white pine blister rust, E. R. Edgerton (*Amer. Forests, 49 (1943), No. 3, pp. 109–111, illus. 5*).—An attempt to evaluate the case of white pine v. blister rust and what should be done about it.

Fungi associated with certain ambrosia beetles, A. F. Verrall. (U. S. D. A.). (*Jour. Agr. Res. [U. S.]. 66 (1943), No. 3, pp. 135–144, illus. 5*).—Four fungi—apparently used as food by their associated ambrosia beetles and probably causing the restricted black or brown stains adjacent to the beetle tunnels in green hardwood logs and lumber—are described as new species: *Endomyces bispora*, associated with *Platypus compositus; Cephalosporium pallidum*, with *Xyleborus affinis; C. luteum*, with *X. pecanis;* and *Monilia brunnea*, with *Pterocyclon mali* and *P. fasciatum*.

ECONOMIC ZOOLOGY—ENTOMOLOGY

Guide to the literature of the zoological sciences, R. C. Smith (*Minneapolis, Minn.: Burgess Pub. Co., [1942], pp. 128+*).

General zoology, T. I. Storer (*New York and London: McGraw-Hill Book Co., 1943, pp. 798+, illus. 556*).

Systematics and the origin of species from the viewpoint of a zoologist, E. Mayr (*New York: Columbia Univ. Press, 1942, pp. 334+, illus. 29*).

The international protection of wild life: An examination of treaties and other agreements for the preservation of birds and mammals, S. S. Hayden (*New York: Columbia Univ. Press, 1942, pp. 246, illus. 4*).—Following a brief introduction, the chapters of this work deal with the subject as relates to preservation of natural communities, protection of birds, and conservation of marine mammals. Additional data given in nine appendixes and a bibliography of 10 pages are included.

Extinct and vanishing mammals of the Western Hemisphere, G. M. Allen (*Amer. Com. Internatl. Wild Life Protect., Spec. Pub. 11 (1942), pp. 620+, illus. 25*).—This report, which is presented in systematic order under the headings of North America and the West Indies (pp. 5–374), South America (pp. 375–416), and oceanic mammals (pp. 417–552), includes a bibliography of 36 pages and a subject index.

Winter food productivity of agricultural land for seed-eating birds and mammals, P. S. Baumgras (*Jour. Wildlife Mangt., 7 (1943), No. 1, pp. 13–18, illus. 2*).

Food of the red fox in southern New Hampshire, W. R. Eadie. (Univ. N. H.). (*Jour. Wildlife Mangt., 7 (1943), No. 1, pp. 74–77*).

Fur yield and autumn foods of the raccoon in Illinois River bottom lands, L. E. Yeager and R. G. Rennels. (Ill. Nat. Hist. Survey.) (*Jour. Wildlife Mangt., 7 (1943), No. 1, pp. 45–60, illus. 1*).

Management studies of the cottontail rabbit in southwestern Michigan, A. O. Haugen (*Jour. Wildlife Mangt., 7 (1943), No. 1, pp. 102–119, illus. 5*).

Life history of the blue goose (Chen caerulescens (Linnaeus)), J. D Soper (*Boston Soc. Nat. Hist. Proc., 42 (1942), No. 2, pp. 121–222, illus. 12*).—This contribution from the National Parks Bureau, Department of Mines and Resources, Ottawa, Canada, presented with a list of 79 references to the literature, brings together information on geographical distribution, Arctic breeding range, nesting grounds, fall migration, wintering grounds, spring migration in the United States and in Canada, food and feeding habits, and protection.

Food habits of the blue grouse, J. Beer. (Wash. State Col. et al.). (*Jour. Wildlife Mangt., 7 (1943), No. 1, pp. 32–34, illus. 4*).—This contribution reports on the food of *Dendragapus obscurus* and *D. fuliginosus* in Washington and Idaho and summarizes the published data on the subject over their entire ranges for a better understanding of their management.

Factors affecting the reproduction of bluegill bream and largemouth black bass in ponds, H. S. Swingle and E. V. Smith (*Alabama Sta. Cir. 87 (1943), pp. 8*).—The importance of a knowledge of factors affecting the reproduction of fish in ponds led to work during an 8-yr. period with from 22 to 100 ponds at the station. These were stocked in various ways, given different management treatments for a period of from 1 to 3 yr., then drained, and the number and weight of the fish produced determined. Some of the factors found to affect the reproduction of bluegills (*Lepomis macrochirus*) and largemouthed black bass (*Huro salmoides*) are summarized. Bluegills reproduced successfully under a wide variety of conditions, and the construction of special spawning areas was unnecessary. They have spawned in experimental ponds at the age of 4 mo. when food was sufficiently abundant for extremely rapid growth, but usually they spawned first at 1 yr. of age. The time and extent of spawning varied widely in adjacent ponds and was dependent upon the abundance of food for the adults. Overcrowded bluegills ate their own eggs; when other food was plentiful few eggs were eaten. In properly balanced ponds spawning occurred at intervals during each month from April to October. Largemouthed black bass did not spawn at less than 10 to 12 mo. of age and then only if they weighed in excess of 5 oz. Bass in some ponds at Auburn began spawning in the middle of April, in others during May and June, and in one the first spawning occurred during the first week in July. They were unable to reproduce in ponds overcrowded with bluegills because the latter ate the bass eggs and newly hatched fry. This was prevented by proper initial stocking or remedied by correcting the overcrowded condition.

The disinfection of trout eggs contaminated with Bacterium salmonicida, L. L. Gee and W. B. Sarles. (Wis. Expt. Sta. et al.). (*Jour. Bact., 44 (1942), No. 1, pp. 111–126*).

Insect invaders, A. Standen (*Boston: Houghton Mifflin Co., 1943, pp. 228+, illus. 56*).

On the speed of development of insect eggs at constant temperatures, J. Davidson (*Austral. Jour. Expt. Biol. and Med. Sci., 20 (1942), No. 4, pp. 233–239, illus. 3*).—The pomace fly (*Drosophila melanogaster*), a hymenopterous parasite (*Habrobracon juglandis* Ashm.), and an orthopteran (*Austroicetes cruciata* Sauss.) were used in the study reported.

Experimental studies on the larval development of Dirofilaria immitis in certain insects, W. A. Summers (*Amer. Jour. Hyg., 37 (1943), No. 2, pp. 173–178*).

Catalogue of bacteria associated extracellularly with insects and ticks, E. A. Steinhaus (*Minneapolis, Minn.: Burgess Pub. Co., [1942]. pp. 206+*).

[Contributions on economic insects] (*Calif. Dept. Agr. Spec. Pub. 189 (1942), pp. 32–34, 44–46, 48–55, 69–77, 95–100, 109–122, illus. 1*).—Contributions presented at the twenty-second and twenty-third annual conferences of the

Western Plant Board held in June 1940 and June 1941, respectively, include the following: Egyptian Alfalfa Weevil *Hypera brunneipennis* Boh., by J. L. E. Lauderdale (pp. 32–34); Host Relationship of the White-Banded Cherry Fruit-Fly *Rhagoletis cingulata* Loew and Certain Closely Related Species of the Genus *Rhagoletis*, by S. C. Jones (pp. 44–46) (Oreg. Expt. Sta.); Development in Quarantine-Entomology in California (pp. 48–55) and Report of the Special Committee to Investigate the Alfalfa Weevil (*Hypera postica*) (pp. 69–74), both by D. B. Mackie; Problems in Enforcement of Oriental Fruit Moth Quarantine, by F. H. Gates (pp. 95–97); and The Present Status of the Legume Weevil *Hypera brunneipennis* Boh. in Yuma Valley, Arizona, by W. C. McDuffie (pp. 109–116), and New Developments in Pest Treatments [With Methyl Bromide], by L. A. Hawkins (pp. 117–122) (both U. S. D. A.).

Seventy-second annual report of the Entomological Society of Ontario, 1941 (*Ent. Soc. Ontario, Ann. Rpt., 72 (1941), pp. 59, illus. 5*).—Contributions presented in this report (E. S. R., 85, p. 785) include the following: Japanese Beetle Situation, by L. S. McLaine (pp. 8–9); Evidences of a Second Generation of the European Corn Borer (*Pyrausta nubilalis* Hbn.) in Ontario, by D. A. Arnott (pp. 9–12); The Corn Borer Situation in Ontario in 1941, With Notes on Hybrid and Broom Corn Infestation, by R. W. Thompson (pp. 12–15); The White Grub Situation in Ontario During 1941 and a Forecast for 1942, by G. H. Hammond (pp. 16–18); The Progress of the Potato Aphid Survey in New Brunswick and Adjacent Provinces, by R. P. Gorham (pp. 18–20); A Timing Experiment With Combinations of Mercury Insecticides Used for the Control of the Onion Maggot, by W. G. Matthewman, A. G. Dustan, and A. C. Davis (pp. 21–23); The Tolerance of Larvae of the Tobacco Moth [Worm] *Phlegethontius quinquemaculata* Haw.) to Nicotine, by G. Beall (pp. 24–25); Observations on the Rise in Temperature Due to Metabolism in Cultures of the Mediterranean Flour Moth (*Ephestia kuehniella* Zell), by G. Wishart (pp. 25–26); Scouting for the European Earwig (*Forficula auricularia* L.) in Ontario, 1938 to 1941, by C. Copeland and C. R. Messer (pp. 27–29); Note on Municipal Baiting Campaign Against the European Earwig (*Forficula auricularia*) at Ayton, Ontario, by A. G. McNally (p. 29); Thermal Preference by Pharaoh's Ant (*Monomorium pharaonis* (L.) as a Guide in Control Work, by J. E. Armand (pp. 30–32); The Relative Susceptibility of the Sexes of *Drosophila melanogaster* Meigh. to Nicotine (Alkaloid) Used as Contact Insecticide, by F. T. Lord (pp. 32–34); Some Recent Experiments on the Control of the Strawberry Weevil (*Anthonomus signatus* Say), by C. W. B. Maxwell (pp. 35–39); Notes on the Egg Masses of the White-Marked Tussock Moth, by L. Caesar (pp. 39–40); Notes on the Laboratory Propagation of Three European Species of *Exenterus* (Ichneumonidae) Parasitic on Sawflies, by A. Wilkes (pp. 41–44); Observations on the Biology of *Mantis religiosa* L., by H. G. James (pp. 45–47); and A Summary of the More Important Crop Pests in Canada in 1941, by C. R. Twinn (pp. 47–56).

Insect control on mint and celery, R. Hutson (*Mich. Muck Farmers Assoc. Proc., 24 (1942), pp. 10–13*).

[Contributions on fruit insects and their control] (*Kans. State Hort. Soc. Bien. Rpt., 46 (1940–41), pp. 31–41, 81–98, 187–188*).—Contributions presented include The Relation Between Bait-Trap Catches and Codling Moth Emergence and Egg Laying, by H. Baker (pp. 31–35) (U. S. D. A.); Peach Tree Borers and Their Control, by G. A. Dean (pp. 37–41) (Kans. State Col.); and Lead Arsenate Soybean Flour and Lead Arsenate Zinc Sulfate Combination Sprays for Codling Moth Control During the Season of 1940 (pp. 81–90), Control of the American Strawberry Leafroller During the Season of 1940 (pp. 91–98), and Effective Control of the American Strawberry Leafroller (pp. 187–188), all by R. L. Parker and P. G. Lamerson (Kans. Expt. Sta.).

Fruit pests of Baluchistan, NAZEER AHMED JANJUA and C. K. SAMUEL (*Imp. Council Agr. Res.* [*India*], *Misc. Bul. 42* (*1941*), *pp. 41+, illus. 3*).

The control of some of Florida's shade tree pests, J. T. CREIGHTON. (Univ. Fla.). (*Natl. Shade Tree Conf. Proc., 18* (*1942*), *pp. 219–233*).

Control of shade tree insects, W. P. FLINT and M. D. FARRAR. (Ill. Expt. Sta. and Ill. Nat. Hist. Survey). (*Natl. Shade Tree Conf. Proc., 18* (*1942*), *pp. 139–148*).

Pest control equipment that may be adapted for use on shade trees, A. M. BOYCE. (Calif. Citrus Expt. Sta.). (*7. West. Shade Tree Conf., Los Angeles, 1940, pp. 78–82*).

Distribution of Beauveria bassiana on elm insects in the United States, P. V. MOOK and D. O. WOLFENBARGER. (U. S. D. A.). (*Phytopathology, 33* (*1943*), *No. 1, pp. 76–77*).

Important insect enemies of the toyon [Photinia (Heteromeles) arbutifolia], H. E. BURKE (*7. West. Shade Tree Conf., Los Angeles, 1940, pp. 90–93*).

The place of methyl-bromide in the disinfection of infested orchid plants, H. M. ARMITAGE. (*Calif. Dept. Agr. Bul., 31* (*1942*), *No. 3, pp. 134–140, illus. 1*).

Killing insects in flour and grain by induction heating, C. R. PIPPINGER (*Amer. Miller, 71* (*1943*), *No. 2, pp. 32–34, illus. 4*).—A progress report of work.

Review of United States patents relating to pest control, [January–December 1942], R. C. ROARK (*U. S. Dept. Agr., Bur. Ent. and Plant Quar., Rev. U. S. Pat. Relat. Pest Control, 15* (*1942*), *Nos. 1, pp. 8; 2, pp. 11; 3, pp. 11; 4, pp. 10; 5, pp. 14; 6, pp. 10; 7, pp. 13; 8, pp. 8; 9, pp. 10; 10, pp. 6; 11, pp. 9; 12, pp. 10*).—A continuation of this series (E. S. R., 87, p. 87).

War-time formulas—insecticides, J. S. HOUSER. (Ohio Expt. Sta.). (*Natl. Shade Tree Conf. Proc., 18* (*1942*), *pp. 57–68*).

Analyses of materials sold as insecticides and fungicides during 1941, C. S. CATHCART and R. L. WILLIS (*New Jersey Stas. Insp. Ser. 4* (*1941*), *pp. 16*).

Biological assay of insecticidal sprays, E. A. PARKIN (*Nature* [*London*], *149* (*1942*), *No. 3791, pp. 720–722*).—A preliminary account of a test that has been worked out for comparison of the insecticidal power of different sprays.

Relative toxicity of insecticides, J. R. BUSVINE (*Nature* [*London*], *150* (*1942*), *No. 3798, pp. 208–209*).—Data are given on the relative resistance of a life stage (adult, pupa, or larva) of several household and stored product insect pests to 12 types of fumigation and vapor poisons which supplement the contribution by Parkin noted above. Attention is called to the author's earlier finding (E. S. R., 80, p. 653) that the relative resistance of insect species changes very much with different types of poison, that one insect may not give a true indication of the effectiveness of a new insecticide.

Some compounds related to sesamin: Their structures and their synergistic effect with pyrethrum insecticides, H. L. HALLER, F. B. LAFORGE, and W. N. SULLIVAN. (U. S. D. A.). (*Jour. Organic Chem., 7* (*1942*), *No. 2, pp. 185–188*).—The authors prepared isosesamin; isomeric with natural sesamin; asarinin, the optical antipode of isosesamin; pinoresinol dimethyl ether, in which the veratryl group replaces the piperonyl group of sesamin; pinoresinol itself; and its diacetyl derivative. When tested (against houseflies) in combination with pyrethrum solutions, isosesamin and asarinin were as effective as sesamin, but pinoresinol dimethyl ether was without appreciable synergistic action, as were pinoresinol itself and diacetyl derivative.

The synergistic action of sesamin with pyrethrum insecticides, H. L. HALLER, E. R. McGOVRAN, L. D. GOODHUE, and W. N. SULLIVAN. (U. S. D. A.). (*Jour. Organic Chem., 7* (*1942*), *No. 2, pp. 183–184*).—The results show clearly that sesamin, a crystalline compound of known structure isolated from sesame seed oil, increases the toxicity of pyrethrum insecticides when tested against flies. Sesamin had little or no toxic effect when used alone.

Rotenone dispersion, H. F. WILSON and G. L. BENDER (*Soap and Sanit. Chem., 18 (1942), No. 10, pp. 101, 103*).—A comparison study of two powdered aluminum silicates used as dispersing agents for rotenone.

Termites in citrus groves, J. R. WATSON. (Fla. Expt. Sta.). (*Citrus Indus., 23 (1942), No. 12, pp. 13, 17*).

The present status of the European earwig in California and its fumigation in balled, canned, or potted nursery stock, D. B. MACKIE, J. B. STEINWEDEN, and W. B. CARTER (*Calif. Dept. Agr. Bul. 31 (1942), No. 3, pp. 110–116, illus. 1*).—It has been found that the European earwig and its eggs are destroyed rather easily by the vapors of methyl bromide in an atmospheric fumigation chamber equipped with heat, a fan, and a humidifier. For the fumigation of infested nursery stock, the following schedules are recommended: 2 lb. per 1,000 cu. ft. for 2 hr. at a minimum temperature of 70° F. and 2.5 lb. per 1,000 cu. ft. for 2 hr. at a minimum temperature of 60°. Higher schedules should be avoided where conifers, indoor decoratives, or other plants sensitive to methyl bromide are involved.

Cockroach control, H. D. TATE and E. C. KLOSTERMEYER (*Nebraska Sta. Cir 72 (1943), pp. 8, illus. 5*).—A practical account.

The Dermaptera and orthopterous families Blattidae, Mantidae, and Phasmidae of Texas, M. HEBARD (*Amer. Ent. Soc. Trans., 68 (1942), No. 4, pp. 239–310, illus. 12*).

Isolation of Staphylococcus albus from hemolymph of the [oriental cock]roach (Blatta orientalis), O. E. TAUBER and J. T. GRIFFITHS, JR. (Iowa State Col.). (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 1, pp. 45–47*).

An analysis of the outbreaks of the Australian plague locust Chortoicetes terminifera Walk. during the seasons 1937–38 and 1938–39, K. H. L. KEY (*Austral. Council Sci. and Indus. Res. Bul. 146 (1942), pp. 88, illus. 23*).

The resistance of citrus thrips to tartar emetic treatment in San Fernando Valley, C. O. PERSING, C. S. BARNHART, W. L. WORTHY, and A. M. BOYCE. (Calif. Citrus Expt. Sta.). (*Calif. Citrog., 28 (1942), No. 1, pp. 5, 24–25, illus. 2*).—During the late summer and fall of 1941 it was observed that the application of tartar emetic and sugar in combating the citrus thrips, as employed commercially since 1939, was ineffective on some 300 acres of lemons in the San Fernando Valley of California. Increased dosages of tartar emetic gave negative results. In feeding experiments in which citrus thrips from an outside area were compared with those from the San Fernando Valley only 0.1 percent of the former survived the tartar emetic treatment, while 32.2 percent of those from this valley were unaffected. Nicotine sulfate has proved to be the most effective compound tested. Under the conditions obtaining it was relatively ineffective unless sugar was incorporated in the spray mixture. Sprays containing nicotine sulfate (1 qt. plus 8 lb. of white sugar (sucrose) per 100 gal.), applied with broom guns at about 2.5 gal. per average-sized mature lemon tree or with the spray duster at 1 gal. per tree, afforded a high initial kill and some protection for a period of 3 or 4 weeks. The spray duster application appears to be superior to the broom gun application and is less expensive. It is pointed out that while information on the use of nicotine sulfate-sugar sprays for citrus thrips control is insufficiently extensive to warrant recommendation this treatment is probably the best control measure available in lemon groves where citrus thrips are causing severe damage and where tartar emetic treatment is no longer effective. About 150 acres in the valley were treated with this spray during the season of 1942 with fairly satisfactory results.

It is considered probable that a biological race of this species of thrips has developed that is relatively resistant to tartar emetic. Control work through use of tartar emetic and sugar has been noted (E. S. R., 83, pp. 219, 523; 84, p. 362; 85, p. 376; 86, p. 217; 87, p. 396).

The effect of light on the incidence of cacao thrips, H. S. Darling (*Trop. Agr.* [*Trinidad*], *19* (*1942*), *No. 8, pp. 151–162, illus. 1*).—Field observations made at 50 stations in 5 localities in Trinidad with a view to providing statistical data on populations of the red-banded thrips on shaded and unshaded cacao and to account for any observed differences in populations are reported upon at length, the details being given in tables.

On the formation of the tracheal funnel in Anasa tristis DeG. induced by the parasite Trichopoda pennipes Fabr., R. L. Beard. (Conn. [New Haven] Expt. Sta.). (*Ann. Ent. Soc. Amer., 35* (*1942*), *No. 1, pp. 68–72, illus. 2*).

The genus Nysius and its allies in the Hawaiian Islands (Hemiptera: Lygaeidae: Orsillini), R. L. Usinger (*Bernice P. Bishop Mus. Bul. 173* (*1942*), *pp. 167+, illus. 21*).—Eighty-four forms representing the genera *Oceanides*, *Glyptonysius* n. g., *Neseis*, *Nysius*, and *Nesomartis* are recognized and described, of which 37 are new to science. A key to some nymphs of Hawaiian Orsillini and a bibliography of 74 titles are included, and their natural enemies, economic importance, and bionomics are discussed.

Bionomics of Catorhintha mendica Stal (Coreidae: Hemiptera), W. V. Balduf. (Univ. Ill.). (*Bul. Brooklyn Ent. Soc., 37* (*1942*), *No. 5, pp. 158–166*).—The results of a study of the bionomics of this large common native coreid bug, conducted largely in the general vicinity of Urbana, Ill., during the years 1940–42, are reported.

A study of Herpetomonas leptocoridis (McCulloch) of the alimentary canal of the box elder bug (Leptocoris trivittatus (Say)), M. W. Kay (*Amer. Micros. Soc. Trans., 61* (*1942*), *No. 2, pp. 120–130, illus. 41*).

The leaf hopper Thamnotettix argentata Evans, a vector of tobacco yellow dwarf, G. A. H. Helson (*Jour. Council Sci. and Indus. Res.* [*Austral.*], *15* (*1942*), *No. 2, pp. 175–184, illus. 4*).—The life cycle of *T. argentata*, which breeds on a wide range of host plants, was studied at four different constant temperatures and shown to develop readily between 22° and 28° C. All attempts to rear the species on tobacco failed. Adults and late instar nymphs overwinter and begin breeding on capeweed and crowfoot in the spring. Many of its hosts are common weeds in tobacco fields or grow in the surrounding pastures, and provide a series of hosts on which the insect is able to breed and survive throughout the year, producing three generations in that time in northern Victoria.

Two new species related to red scale (Homoptera: Coccoidea: Diaspididae), H. L. McKenzie (*Calif. Dept. Agr. Bul., 31* (*1942*), *No. 3, pp. 141–147, illus. 2*).—*Aonidiella ensifera* from *Hedera helix* in Chile and *A. paucitatis* from the hat palm (*Carludovica palmata*) in Panama are described as new. A key to the 19 species of this genus is included.

Attempts at mass infection of California citrus red scale with bacteria, V. P. Sokoloff and L. J. Klotz (*Phytopathology, 32* (*1942*), *No. 9, p. 829*).—An abstract of additional work (E. S. R., 87, p. 548).

The control of pediculosis and scabies by means of preparations containing pyrethrins, rotenone, and aliphatic thiocyanates, C. R. Twinn and C. G. MacNay (*Canad. Ent., 75* (*1943*), *No. 1, pp. 4–13*).—The results of tests of a number of mixtures against head lice on children and scabies and crab lice on soldiers are reported. "Preparations containing Lethane (a mixture of aliphatic thiocyanates), 20 lb. and 30 lb. extracts of pyrethrum, or derris extract (5 percent rotenone), in various concentrations, quickly killed head lice and their eggs. Derris powder (5 percent rotenone) was also effective. Sta-Way, a proprietary repellent lotion, killed the lice on contact, but results were less conclusive than with the other materials. The Lethane and pyrethrum extract, mixed with deodorized kerosene, were effective in concentrations as low as ordinary spray strength, but for general use higher concentrations are probably desirable. The liquid preparations were applied at the rate of 0.25 fluid oz. to each female head and about one-half that quantity to each male head. The dosage of derris powder was 1 level teaspoonful per female head. No discomfort or ill effects from the use of these preparations was reported. The cost of materials for each treatment, except in the case of Sta-Way, was less than 1 ct. All cases of crab lice and more than 90 percent of cases of scabies were completely controlled by one application of ointments containing pyrethrum extract, Lethane, or rotenone in various concentrations and lotions containing pyrethrum extract or Lethane. The remaining cases of scabies were controlled by a second treatment. The concentrations of insecticides used ranged from 1.8 to 0.6 percent pyrethrins (15 to 5 times spray strength), 2.5 to 0.5 percent rotenone, and 50 to 10 percent Lethane (about 10 to 2 times spray strength). Scrubbing or shaving the affected parts before treatment was found to be unnecessary and undesirable, the former, at least, being an important contributing factor to skin irritation, especially when using ointments containing Lethane or rotenone. Reduction of the concentration of these latter materials decreased the tendency of ointments containing them to irritate the skin without impairing their effectiveness. The pyrethrum preparations caused little or no discomfort even when prior washing or scrubbing was practiced. The reported cure of a case of barber's itch by a mixture of Lethane and Russian oil is recorded."

Biological control of the Japanese beetle, E. N. Cory (*Natl. Shade Tree Conf. Proc., 18 (1942), pp. 148–154*).

Revision of the genus Phloeosinus Chapuis in North America (Coleoptera: Scolytidae), M. W. Blackman (*U. S. Natl. Mus. Proc., 92 (1942), No. 3154, pp. 397–474, illus. 4*).—The genus of bark beetles dealt with represents one of the most widely distributed, occurring in all of the large continental land masses and in many islands. All of the North American forms from Alaska to Mexico, inclusive, 45 in number, are considered, of which 16 are described as new to science. All but 3 of the known North American species of *Phloeosinus* breed in the inner bark of cupressine and taxodiine trees of the genera *Sequoia, Taxodium, Libocedrus, Thuja, Cuprssus, Chamaecyparis* and *Juniperus.*

Monograph of the West Indian beetles of the family Staphylinidae, R. E. Blackwelder (*U. S. Natl. Mus. Bul. 182 (1943), p. 658+, illus. 22*).

Black flour beetle, Tribolium madens Charp., in British Columbia (Coleoptera: Tenebrionidae), H. B. Leech (*Canad. Ent., 75 (1943), No. 2, p. 40*).

The nutritional requirements of Tribolium confusum Duval.—II, The effect of vitamin B complex on metamorphosis, growth, and adult vitality, B. A. Schneider (*Amer. Jour. Hyg., 37 (1943), No. 2, pp. 179–192, illus. 3*).—A continuation of this investigation (E. S. R., 85, p. 379).

Some work on the white pine weevil, R. P. Holdsworth. (Mass. State Col.). (*Jour. Forestry, 41 (1943), No. 2, pp. 143–144*).—The value of the removal of tips from white pine in combating the white-pine weevil, as tested at Mt. Toby Forest in Massachusetts, is briefly reported upon.

The mountain pine beetle, an important enemy of western pines, J. C. Evenden, W. D. Bedard, and G. R. Struble (*U. S. Dept. Agr. Cir. 664 (1943), pp. 25, illus. 20*).—The mountain pine beetle is an important enemy of all commercial pines within the forests of the western part of the United States. Losses of timber resulting from its attack involve large stumpage values and play an important role in the successful practice of sustained-yield forest management. Beetle-killed trees materially increase the fire hazard of forest areas and add to the difficulty and cost of fire suppression. This beetle attacks and destroys mature pine trees by constructing feeding galleries between the bark and wood. Although successfully attacked trees cannot be saved, there are available for different tree species and areas practical methods of control which destroy the insect broods and prevent their emergence and subsequent attack of other trees. This circular describes the mountain pine beetle and its work, its importance to the practice of forestry, its seasonal history, and methods of control employed to suppress destructive epidemics.

The gorse weevil, J. W. Evans (*Tasmanian Jour. Agr., 13 (1942), No. 1, pp. 15–18, illus. 2*).—An account of a weevil (*Apion ulicis*) introduced into New Zealand from England in 1937 for the control of gorse (*Ulex europaeus*), a weed of considerable economic importance. Wherever the weevil is thoroughly established over 90 percent of the seed is being regularly destroyed, and in one locality as high a percentage as 98.67 of weevil-infested pods has been recorded.

La polilla de la papa (Gnorimoschema operculella (Zeller)) y su control [The potato tuber worm and its control], K. J. Hayward (*Rev. Indus. y Agr. Tucumán, 32 (1942), No. 4–6, pp. 153–161, illus. 5*).

Inert mineral dusts as a means of control for potato moth, Phthorimaea operculella Zell., in stored potatoes, G. A. H. Helson (*Jour. Council Sci. and Indus. Res. [Austral.], 15 (1942), No. 4, pp. 257–261, illus. 1*).—Of the mineral dusts tested against the potato tuber worm as substitutes for derris, finely ground magnesite used at the rate of 20 lb. per ton was most satisfactory in laboratory tests. It reduced the number of eggs deposited by females, acted as a larvicide, and is sufficiently effective and cheap to be used as a substitute for derris. Its efficiency does not appear to be affected by humidities below 80 percent. The dust, however, will not prevent infection of the sprouts which form after treatment.

Note on the effect of the acetylene treatment of potato tubers on potato moth, Phthorimaea operculella Zell., G. A. H. Helson (*Jour. Council Sci. and Indus. Res. [Austral.], 15 (1942), No. 4, pp. 268–269*).—It was found that the acetylene treatment for breaking dormancy in seed potatoes has no effect upon the development of eggs of the potato tuber worm, but within tubers there is a progressive effect on the larvae, most of which are killed after 4 hours' immersion in the solution.

The biological campaign against prickly-pear, A. P. Dodd (*Brisbane, Queensland: Commonwealth Prickly Pear Bd., 1940, pp. 177+, illus. 43*).—This is a detailed report of biological investigations conducted during the campaign for control and eradication of the pricklypear (*Opuntia* spp.) pest in Australia, commenced by the Commonwealth Prickly Pear Board in 1920 and resulting in virtually complete control by 1940, accomplished through introduction of the phycitid lepidopteron *Cactoblastis cactorum*. The larvae in tunneling through the plants are accompanied by fungus and bacterial rots which hasten the destruction. Originally described in 1885 from Uruguay, *C. cactorum* was introduced into Australia from Argentina in 1925 (following an unsuccessful attempt in 1914), where it was reared in cages and 1 yr. later was released in the field. Within 2 yr. after the arrival of the 2,750 eggs from Argentina 14 liberations totaling 2,540,000 eggs were made in Queensland and 5 in New South Wales. By June 1929 the pricklypear pest had been destroyed on 30,000 acres, on 500,000 acres by June 1930, and completely by 1940.

The several chapters are devoted respectively to: (1) A general discussion and summary, (2) the pricklypears, (3) the board and its policy, (4) the cactus insects, (5) plant diseases of the Cactaceae, (6) the host limitation aspect, (7) establishment of the insects in Australia, (8) *Cactoblastis cactorum* and its control of pricklypear, and (9) enemies of *Cactoblastis* and other control factors. A map showing in colors the main prickly pear areas of the two states and a list of the more important literature, among which are eight contributions by the author, are included.

A new species of Laspeyresia, a bean pest from tropical America (Lepidoptera: Olethreutidae), C. Heinrich. (U. S. D. A.). (*Ent. Soc. Wash. Proc., 45 (1943), No. 3, pp. 71–73, illus. 5*).—Under the name *L. leguminis* description is given of a new moth which appears to be of some importance as a pest of beans in Peru and has been intercepted at border quarantine stations in beans from Mexico. All varieties, including lima beans, string beans, and soybeans, appear to be attacked.

Programs for codling moth control, C. R. Cutright. (Ohio Expt. Sta.). (*Amer. Pomol. Soc. Proc., 57 (1941), pp. 23–33*).

Programs for codling moth control, C. R. Cutright. (Ohio Expt. Sta.). (*Mich. State Hort. Soc. Ann. Rpt., 71 (1941), pp. 12–19*).

Effect of host plant on the susceptibility of the southern armyworm (Prodenia eridania Cram.) to calcium arsenate, B. G. Markos (*Ohio State Univ., Abs. Doctoral Diss., No. 35 (1941), pp. 193–200*).—Description is given of a simple, practicable method that has been devised for feeding (quantitatively) a relatively insoluble stomach poison to the southern armyworm. It differs from other methods in that the dose can be predetermined and easily reproduced. The median lethal dose of calcium arsenate to the early sixth instar, as determined by this method, was found to be 0.18 mg. per gram of body weight when the insect was reared on cranberry bean. Varying degrees of susceptibility to calcium arsenate were displayed when the median lethal dose, 0.18 mg. per gram of body weight, was ingested on different species of leaves on which the larvae had been reared. The test insects were found to be most susceptible when reared on rhubarb and most resistant to poisoning when reared on corn, soybean, squash, and burdock. No significant differences in susceptibility were apparent when the test insects were reared on kale, the mortality being similar to cranberry bean, the standard plant.

The maize stalk-borer (*Farming in So. Africa, 17 (1942), No. 201, pp. 763–766, illus. 2*).—A brief summary of the results of 3 yr. of intensive studies conducted by C. du Plessis and H. A. F. Lea in the Orange Free State.

Observations upon the biological control of the sugarcane borer in Florida, L. C. Scaramuzza (*Asoc. Téc. Azucareros Cuba, Proc. Ann. Mtg., 15 (1941), pp. 53–56*).—Control work with insect parasites is reviewed.

Diptera associated with ironweed, Vernonia interior Small, in Kansas, R. B. Schwitzgebel and D. A. Wilbur. (Kans. Expt. Sta.). (*Jour. Kans. Ent. Soc., 16 (1943), No. 1, pp. 4–13, illus. 8*).—In their investigation of the ironweed insects of eastern Kansas (E. S. R., 87, p. 549) the authors have found at least 44 species of Diptera representing 19 families. This discussion concerns 10 species which are known to live on this important weed and 34 species collected on it but whose relationship to the plant has not been determined.

New Jersey Mosquito Extermination Association, twenty-ninth annual meeting (*N. J. Mosquito Extermin. Assoc. Proc., 29 (1942), pp. 166+, illus. 15*).—Among the contributions presented at the meeting held at Atlantic City in March 1942 (E. S. R., 86, p. 512) are the following: Important Mosquito Borne Diseases

That are Likely to Affect the Middle Atlantic and Northeastern States, by R. Matheson (pp. 7–9) (Cornell Univ.); Mosquito Control in the Army Reservations in the Middle Atlantic and Northeastern States, by W. A. Hardenbergh and L. K. Clark (pp. 27–30); Mosquito Control by the United States Navy at Naval Stations in the Middle Atlantic States, by O. J. Brown (pp. 30–35); Malaria Control in Defense Areas, by L. L. Williams (pp. 35–37); An Informal Discussion of the Work of the Bureau of Entomology and Plant Quarantine on Mosquito Control, by E. C. Cushing (pp. 37–39) (U. S. D. A.); Notes on Anophelines in Southern New Jersey, by L. A. Stauber (p. 44); Bird Malaria in Southern New Jersey, by M. F. and L. A. Stauber (pp. 45-46); The Chemical Nature of Growth Factors Required by Mosquito Larvae, by W. Trager (pp. 46–48); A Further Development in Machinery for Digging and Cleaning Salt Marsh Ditches (pp. 48–50) and A Summary of Mosquito Control Work in New Jersey in 1941 (pp. 60–98), both by T. D. Mulhern (N. J. Expt. Stas.); Mosquito-Control Developments in Delaware During 1941, by L. A. Stearns and E. E. Lynch (pp. 99–103) (Del. Sta. et al.); A New Tide Gate and Time-Saving Devices Used in Its Construction, by J. P. Peterson (pp. 106–108); Some Examples of Mosquito Ecology in the Pacific Northwest, by H. H. Stage (p. 123), A Review of Mosquito Work Throughout the World in 1941, by F. C. Bishopp and H. H. Stage (pp. 125–143), and Soil Sampling for Studying Distribution of Mosquito Eggs on Salt Marshes in Florida, by G. H. Bradley and B. V. Travis pp. 143–146) (all U. S. D. A.); and Experiments With Three Types of Pyrethrum Oil Emulsions of the New Jersey Mosquito Larvicide, by J. M. Ginsburg (pp. 159–163) (N. J. Stas.).

Experimental attempts to infect man with avian malaria, S. B. McLendon (*Amer. Jour. Hyg., 37 (1943), No. 1, pp. 19–20*).—In experiments undertaken to determine if man can be infected with avian malaria seven transfers of the pigeon strain gave negative results. It was shown that this organism can live in the human circulation and remain infective to pigeons for as long as 4.5 hr. As much as 8.5 cc. of citrated pigeon blood or 13 billion pigeon erythrocytes containing 9 billion *Plasmodium relictum* parasites can be given intravenously to man without producing harmful effects. In the one instance in which a slight elevation of temperature followed the injection, the reaction was no more severe than sometimes accompanies similar transfusions of human blood.

A symposium on human malaria, with special reference to North America and the Caribbean region, edited by F. R. Moulton (*Amer. Assoc. Adv. Sci., Pub. 15 (1941), pp. 398+, illus. 130*).—Among the contributions to this symposium are the following which relate to anopheline vectors: General Morphology of *Anopheles* and Classification of the Nearctic Species (pp. 63–70), Distribution of the Nearctic Species of *Anopheles* (pp. 71–78), and Bionomics and Ecology of Nearctic *Anopheles* (pp. 79–87), all by W. V. King and G. H. Bradley (U. S. D. A.); The Classification and Identification of the *Anopheles* Mosquitoes of Mexico, Central America, and the West Indies, by W. H. W. Komp (pp. 88–97); Distribution and Ecology of the *Anopheles* Mosquitoes of the Caribbean Region, by L. E. Rozeboom (pp. 98–107); Factors Influencing Infection of *Anopheles* With Malarial Parasites, by C. G. Huff (pp. 108–112); and The Transmission of Malaria by the *Anopheles* Mosquitoes of North America, by J. S. Simmons (pp. 113–130). Contributions to control and eradication are: General Considerations in Planning Malaria Control, by J. Andrews (pp. 285–294); Malaria Survey—Methods and Procedures, by J. E. Elmendorf, Jr. (pp. 295–301); Methods Directed Against Adult Mosquitoes in the Control and Eradication of Malaria, by D. M. Jobbins (pp. 302–314); Drainage and Filling Methods for Mosquito and Malaria Control, by N. H. Rector (pp. 315–323); The Management of Water for Malaria Control, by E. H. Hinman (pp.

324–332); Petroleum Products for Mosquito Control, by J. M. Ginsburg and W. Rudolfs (pp. 333–336) (N. J. Expt. Stas.); Paris Green (Aceto Arsenite of Copper) and Other Stomach Poisons as Larvicides Against Mosquito Larvae, by M. A. Barber (pp. 337–346); Naturalistic Methods of Malaria Control, by P. F. Russell (pp. 347–352); Adaptability of Control Measures to the Nearctic Fauna of *Anopheles* Mosquitoes, by H. A. Johnson (pp. 353–358); The Adaptability of Control Measures to the Malaria Vectors of the Caribbean Region, by H. W. Kumm (pp. 359–364); and The Anti-malaria Program in North America, by L. L. Williams, Jr. (pp. 365–370).

The microclimate of diurnal resting places of Anopheles quadrimaculatus Say in the vicinity of Reelfoot Lake, D. E. Eyles and L. K. Bishop (*Pub. Health Rpts.* [*U. S.*], *58* (*1943*), *No. 6, pp. 217–230, illus. 4*).

A strain of the mosquito Aedes aegypti selected for susceptibility to the avian malaria parasite Plasmodium lophurae, W. Trager (*Jour. Parasitol.*, *28* (*1942*), *No. 6, pp. 457–465*).

New Dolichopodidae of western North America, F. C. Harmston and G. F. Knowlton. (Utah Expt. Sta.). (*Ann. Ent. Soc. Amer.*, *35* (*1942*), *No. 1, pp. 17–22, illus. 13*).

Key to the larvae of botflies and warble flies infesting domestic animals in New York State, H. T. Dalmat and D. W. Baker. (Cornell Univ. et al.). (*Cornell Vet.*, *32* (*1942*), *No. 4, pp. 424–429, illus. 10*).

An unusual rearing of Rainieria brunneipes (Cresson) (Diptera: Micropezidae), C. W. Sabrosky. (Mich. Expt. Sta.). (*Ent. News*, *53* (*1942, No. 10, pp. 283–285, illus. 4*).

The Nearctic species of parasitic flies belonging to Zenillia and allied genera, W. F. Sellers (*U. S. Natl. Mus. Proc.*, *93* (*1943*), *No. 3157, pp. 108*).—A revision of the known species of parasitic Diptera of the genera *Zenillia*, *Phryxe*, *Carcelia*, *Aplomya*, *Sisyropa*, *Thelympia*, and *Angustia* n. g., together with some Palearctic species of the genera *Zenillia*, *Phryxe*, *Carcelia*, and a *Aplomya* and some Neotropical species of the genera *Zenillia*, *Carcelia*, and a second new genus (*Chrysophryxe*). Keys to the genera and for the separation of the species of some of the genera are included.

New North American Muscoidea (Tachinidae: Diptera), H. J. Reinhard. (Tex. Expt. Sta.). (*Jour. Kans. Ent. Soc.*, *16* (*1943*), *No. 1, pp. 14–23*).—Seven species of Diptera of the family Tachinidae, hosts not recorded, are described as new.

Some fleas collected from the Oklahoma cottontail rabbit (Sylvilagus floridanus alacer (Bangs)), G. W. Eddy. (Okla. A. and M. Col.). (*Jour. Kans. Ent. Soc.*, *16* (*1943*), *No. 1, pp. 1–3*).—While engaged in a study of the seasonal history of the rabbit tick about 3,330 specimens of fleas representing 7 species were collected in Payne County, Okla., as follows: The sticktight flea 47, *Hoplopsyllus affinis* (Baker) 3,080, *Cediopsylla simplex* (Baker) 194, human flea 6, cat flea 2, *Orchopeas leucopus* (Baker) 1, and *Orchopeas* sp. (probably *sexdentatus*) 1. A table is given which shows the average number of fleas (*H. affinis* and *C. simplex*) collected from the cottontail rabbit during the year 1939. *H. affinis* was collected in every month, but *C. simplex* was not taken during September, October, or November.

The skeleto-muscular mechanisms of the honey bee, R. E. Snodgrass. (U. S. D. A.). (*Smithsn. Misc. Collect.*, *103* (*1942*), *No. 2, pp. 120+, illus. 32*).

The Argentine ant versus the parasites of the black scale, S. E. Flanders. (Calif. Citrus Expt. Sta.). (*Calif. Citrog.*, *28* (*1943*), *No. 5, pp. 117, 128, 137, illus. 1*).

Life history and habits of the cicada killer in Ohio, C. A. DAMBACH and E. GOOD. (U. S. D. A.). (*Ohio Jour. Sci., 43 (1943), No. 1, pp. 32–41, illus. 6*).—The essential facts concerning the life history and habits of *Sphecius speciosus* Drury, the cicada killing wasp, based on published accounts and the authors' personal observations, are presented.

Two new species of Allotropa (Platygasteridae: Serphoidea) parasitic on the Comstock mealybug, C. F. W. MUESEBECK (*Bul. Brooklyn Ent. Soc., 37 (1942), No. 5, pp. 170–173, illus. 1*).—Two new hymenopterous parasites of the Comstock mealybug, apparently of Japanese origin, are described. The first, which was reared in several localities in Virginia, is named *A. burrelli* and the second, reared in New Jersey, *A. convexifrons.*

Oösorption and ovulation in relation to oviposition in the parasitic Hymenoptera, S. E. FLANDERS. (Calif. Citrus Expt. Sta.). (*Ann. Ent. Soc. Amer., 35 (1942), No. 3, pp. 251–266, illus. 3*).—It is pointed out that in the parasitic Hymenoptera the occurrence of oosorption prior to ovulation and the storing of ripe eggs after ovulation are adaptations for maintaining the reproductive capacity of the species when environmental conditions are unfavorable for oviposition. "Eggs may be stored for periods longer than that necessary for incubation only when they are hydropic, that is, when they lack nutritive substances necessary for embryonic development. In certain species of *Apanteles* the ovary and its oviduct are modified for storing its full quota of eggs. The fact that the ripe eggs of certain species of encyrtids possess structures which are not absorbed provided proof of the synchronous nature of the oogenic-oosorptive processes that occur in many Hymenoptera. Oosorption was found to occur only when ovulation was inhibited. When there is a sequence of developing oocytes in the ovarioles the leading or ripe egg is always newly formed, the preceding egg having disappeared, either through oosorption or ovulation. Oosorption on one hand and the storing of ripe eggs on the other are adaptations permitting the restraint in oviposition which is so essential to host selection. In the lecaniine scale parasite *Metaphycus helvolus*, the adult female of which habitually feeds on its host, the resumption of oogenesis after phasic castration is solely dependent on host feeding."

European spruce sawfly in 1942, R. E. BALCH (*Pulp and Paper Mag. Canada, 44 (1943), No. 3, pp. 3, 279, 281–282, illus. 1*).

Remarks on the taxonomy of some American chiggers (Trombiculinae), including the descriptions of new genera and species, H. E. EWING. (U. S. D. A.). (*Jour. Parasitol., 28 (1942), No. 6, pp. 485–493, illus. 11*).—The author reports that up to the present time 10 valid genera and 76 valid species representing the parasitic larvae of mites of the subfamily Trombiculinae, which infest vertebrates exclusively and are known as chiggers, have been recorded from the Western Hemisphere. To this number there are here added 4 genera, 2 of which are new, and 7 species, all being new.

On Mexican centipeds, R. V. CHAMBERLIN (*Utah Univ. Bul., 33 (1943), No. 6, pp. 1–55, illus. 35*).

The American chiggers (larvae of the Trombiculinae) of the genus Acariscus, new genus, H. E. EWING. (U. S. D. A.). (*Ent. Soc. Wash. Proc., 45 (1943), No. 3, pp. 57–66, illus. 1*).

The control of Pediculoides ventricosus (Newport) in insect cultures, F. J. GAY and T. GREAVES (*Jour. Council Sci. and Indus. Res. [Austral.], 15 (1942), No. 4, pp. 315–317*).—Description is given of a method for controlling this mite, frequently a troublesome pest in stock cultures of insects, through the use of a 2-percent solution of dinitro-o-cyclohexylphenol in oil.

Eriophyid studies, XII, H. H. Keifer (*Calif. Dept. Agr. Bul., 31 (1942), No. 3, pp. 117–129, illus. 7*).—This further contribution (E. S. R., 86, p. 224) presents an account of experimental taxonomy illustrating female dimorphism, or alternation of generations, in *Oxypleurites aesculifoliae* K., the buckeye rust mite. This mite serves as an example of the life histories of a limited number of other species on deciduous trees and shrubs. Twelve forms are noted.

Hypodectes chapini n. sp. (Acarina) from the red-shafted flicker, G. M. Spurlock and J. T. Emlen, Jr. (Univ. Calif.). (*Jour. Parasitol., 28 (1942), No. 4, pp. 341–344, illus. 1*).

Host and seasonal notes on the rabbit tick (Haemaphysalis leporispalustris), C. R. Joyce and G. W. Eddy. (Iowa Expt Sta.). (*Iowa State Col. Jour. Sci., 17 (1943), No. 2, pp. 205–212, illus. 1*).—In studies conducted on the Tama (Iowa) Indian Reservation from April 16 to December 23, 1941, the rabbit tick was found to be second in abundance to the American dog tick. Of all ticks collected, 20.8 percent were the rabbit tick. Many of the common ground-feeding birds were found to be very important as hosts for the immature forms of this tick. Twenty-nine bird species from which ticks were removed are listed. Of these, 11 are apparently new host records. A table showing the seasonal trend is given of 9 months' collection of the rabbit tick from the Mearns cottontail taken from the Tama vicinity. The isolation of the tick parasite *Ixodiphagus texanus* Howard from a nymph of the rabbit tick at Tama is also reported.

The efficiency of the Baermann apparatus in the recovery of larvae of Haemonchus contortus, A. G. Dinaburg. (U. S. D. A.). (*Jour. Parasitol., 28 (1942), No. 6, pp. 433–440, illus. 3*).—The percentage of infective larvae of *H. contortus* recovered after passage in the Baermann apparatus through cloth, cloth plus 100 gm. of sandy loam, and cloth plus 100 gm. of ground sheep feces was determined in 27 experiments. The efficiency of the Baermann apparatus varied with the type of material used as substrate and the initial number of larvae. In 7 experiments involving 150 to 420 larvae, an average of 24, 11, and 5 percent were recovered after passage through layers of cloth, soil, and feces, respectively, whereas in 15 to 19 experiments with 600 to 95,400 larvae these averages were 74, 33, and 11 percent, respectively. In experiments with more than 600 larvae, the variations in percentage recovery between experiments with cloth or soil layers were due mainly to inconsistent operation of the apparatus rather than to variations in the technic of handling and counting of the larvae before and after passage through the apparatus. The variation in technic is about the same in all three groups.

ANIMAL PRODUCTION

Record of proceedings of the 35th annual meeting of the American Society of Animal Production (*Jour. Anim. Sci., 2 (1943), No. 1, pp. 80–99*).—The official annual report of the 1942 meeting is presented, including the minutes of the business meeting; the constitution of the society; the presidential address by R. M. Bethke (pp. 80–82) (Ohio Expt. Sta.); The Responsibility of Research Workers in Livestock Production in the War Program, by N. Clark (pp. 83–88) (Wis. Sta.); and Live Stock in War-Time Britain, by J. A. Scott Watson (pp. 88–91).

Range management, L. A. Stoddart and A. D. Smith (*New York and London: McGraw-Hill Book Co., 1943, pp. 547+, illus. 167*).—Proper management of range lands and the conservation of range resources are described. Land policies as they have developed in the grazing regions of the West and the kind and breeds of livestock most used for grazing purposes are discussed. Attention is given to methods of managing ranges through the development of watering places, artificial seeding, burning, poison plant problems, and wild animals.

Range conservation best way to maintain high production, L. A. Stoddart (*Farm and Home Sci.* [*Utah Sta.*], *4* (*1943*), *No. 1, p. 10, illus. 2*).—Improvement of a range has been effected by conservation and protection during the grazing season and deferred grazing when the grass is maturing seed. Supplementary feeding avoids overgrazing and reduces erosion.

Seasonal changes in the lignin and cellulose content of some Montana grasses, II, A. R. Patton. (Mont. Expt. Sta.). (*Jour. Anim. Sci.*, *2* (*1943*), *No. 1, pp. 59–62*).—The lignin and cellulose contents of nine Montana grasses sampled in 1941 at different stages of maturity were shown to increase with the season in a manner comparable to those sampled in 1940 (E. S. R., 87, p. 99). Blue grama grass was exceptional in that it had a high lignin content in the early vegetative stage.

Losses in silage-making, A. E. Perkins (*Ohio Sta. Bimo. Bul. 220* (*1943*), *pp. 32–34*).—The water contents of silages from corn, mixed legumes, alfalfa, and timothy were ascertained.

Evaluation of feeds on the basis of net available nutrients, M. Kriss et al. (Pa. Expt. Sta.). (*Jour. Anim. Sci.*, *2* (*1943*), *No. 1, pp. 63–79*).—After a historical presentation and analysis of net energy determinations by Kellner, Armsby, and Forbes and the production replacement values of feeding stuffs advocated by Fraps, Morrison, and Kleiber, the authors come to the conclusions that the purposes for which the ration is fed may modify its net energy value. The metabolizable energy of a ration may be affected by the plane of nutrition and the sparing effect of certain feeds in relation to the katabolism of body tissue nutrients. Thus heat production of fast may not express the real energy expense of food utilization. Because the heat increments of rations for maintenance are decidedly less than the body increase, the net energy values for maintenance are higher than for body increase. For convenience, net energy for production may serve for the expression of net energy for maintenance. Modifications of the environmental temperature above or below thermal neutrality will increase the net energy required. The utilization of metabolizable energy for body increase was not affected by the plane of nutrition within fairly wide limits above maintenance. A big unsettled question seems to be the variable influence of different combinations of feeds and variable environmental conditions. Examples of net energy variations with different feed combinations from calorimeter studies of the Pennsylvania Institute of Animal Nutrition are presented.

How to choose commerical feeds, A. G. Hogan (*Missouri Sta. Cir. 245* (*1942*), *pp. 6, illus. 2*).—A brief explanation is given of the use made of the ingredients indicated in the analysis of feeds. It is pointed out that the Missouri feed law requires guaranties for protein, fat, fiber, and nitrogen-free extract. Analyses for moisture and ash are also given. This information may be employed in the use of feeds for compounding rations for the different classes of animals.

Analyses of commercial feeding stuffs and registrations for 1941 [and 1942], C. S. Cathcart (*New Jersey Stas. Insp. Ser. 3* (*1941*), *pp. 64; 7* (*1942*), *pp. 62*).—The guaranteed and found analyses of the feeding stuffs officially examined in 1940 and 1941, respectively (E. S. R., 84, p. 656).

A handbook for better feeding of livestock, P. E. Howe, H. M. Harshaw, and T. E. Woodward (*U. S. Dept. Agr., Misc. Cir. 12, rev.* (*1942*), *pp. 71, illus. 13*).—General directions for feeding different classes of livestock are presented (E. S. R., 50, p. 774).

Nutrition and reproduction of farm animals, P. H. PHILLIPS (*Holstein-Friesian World, 40 (1943), No. 5, pp. 16–17, 52*).—A summary of knowledge of the relation of nutrition to reproduction.

Nutrition of the guinea pig, H. A. SOBER, G. J. MANNERING, M. D. CANNON, C. A. ELVEHJEM, and E. B. HART. (Wis. Expt. Sta.). (*Jour. Nutr., 24 (1942), No. 6, pp. 503–514*).—Thirty-six groups of (usually) 5 guinea pigs each were fed for 7 weeks on standard rations of dextrin or sucrose, casein, and lard or corn oil with supplements of milk, grass, grass juice, kidney, and yeast, singly or in combination. The average daily gains indicated that the guinea pigs require a factor or factors for growth which were supplied by grass, yeast, and winter milk, but that they were not the same in these supplements. Indications were that the factor in milk was not a protein constituent and not a required amino acid from the yeast. Supplementary data showed that the yeast used was a fair source of the grass-juice factor.

The nutritive value of certain fish meals as determined in tests with swine and rats, E. R. BARRICK, C. M. VESTAL, and C. L. SHREWSBURY. (Ind. Expt. Sta.). (*Jour. Agr. Res. [U. S.], 66 (1943), No. 3, pp. 125–134*).—When added as 20 percent of the protein mixture, fish meals from menhaden, sardines, and herring caused the average daily gains of pigs in three trials each to be 1.67, 1.71, and 1.64 lb., respectively. The main ingredient of the ration consisted of corn alone. The pigs were fed from approximately 70 lb. to 225 lb. average live weight. In ad libitum experiments with rats, sardine and whitefish meal appeared to be slightly more palatable and to have a higher nutritive value than the other fish meals, while in controlled feeding experiments on 8.5, 10.5, and 12.5 percent protein from fish meals, the sardine and herring meals were superior in nutritive value to menhaden meal.

Rations for livestock and poultry (*Missouri Sta. Cir. 249 (1943), pp. 12*).—Articles are assembled on rations for dairy cattle and calves, by A. C. Ragsdale; beef cattle, swine, and ewes and lambs, by E. A. Trowbridge; and turkeys and chickens, by H. L. Kempster.

Influence of sex and sex hormones on the breaking strength of bones of mice, W. U. GARDNER (*Endocrinology, 32 (1943), No. 2, pp. 149–160, illus. 8*).—Determinations of the breaking strength of the femurs of 162 mice showed the strength to decline as age advanced. Femur strength was improved by oestrogen treatment and was especially pronounced in males treated with this hormone. Weaker bones were produced by testosterone propionate with or without oestrogen treatment. In the conduct of the study 241 mice were employed for the treatments with one or the other sex hormones at different ages.

Bioassay of the pituitary growth hormone: Width of the proximal epiphysial cartilage of the tibia in hypophysectomized rats, H. M. EVANS, M. E. SIMPSON, W. MARX, and E. KIBRICK. (Univ. Calif.). (*Endocrinology, 32 (1943), No. 1, pp. 13–16, illus. 2*).—A method for the quantitative determination of the increase in the width of the proximal epiphysis of the tibia in the hypophysectomized rat showed the bone test to be approximately three times as sensitive as the body weight test (E. S. R., 86, p. 767), and to require four-fifteenths of the time and about one-eleventh as much of the hormone. The studies were conducted with a total of 173 hypophysectomized rats in groups of from 8 to 25 animals each.

Evidence against a progesterone-like action of ascorbic acid, P. C. PRATT (*Endocrinology, 32 (1943), No. 1, pp. 92–96, illus. 10*).—No progesteronelike activity of ascorbic acid was noted in experiments with rabbits to which crystalline vitamin C was administered subcutaneously or applied locally to the uterus in doses of from 200 to 500 mg. per day for 5 or 10 days. The test animals were primed for 7 days with doses of 0.005 mg. of oestradiol dipropionate.

The utilization of fats by Herbivora, H. Paul and C. M. McCay. (Cornell Univ.). (*Arch. Biochem., 1 (1942), No. 2, pp. 247–253*).—Continuing previous studies on the utilization of fats (E. S. R., 82, p. 415), it was found that rabbits could tolerate as much as 30 percent by weight of the ration for 8–10 days, but sheep tended to refuse to eat after a few days on rations with such high fat levels. However, as much as 10 percent fat was consumed by sheep for relatively long periods. When 6 percent oleic acid was added to a basal fat-free diet about 95 percent of the fat was utilized by guinea pigs, as contrasted with only 56 percent of the fat supplied by elaidic acid. On the other hand rats made 96 percent utilization of fats from rations containing 10 percent oleic acid or elaidic acid. There was a greater weight of the feces of rats fed elaidic acid. Additions of 6 percent cottonseed oil, hydrogenated oil (Crisco), or castor oil to an ether-extracted ration showed utilization of 91–92 percent of these hard and soft fats by rabbits. In several trials with a 30-kg. lamb on a normal diet and with these fats, it was concluded that sheep and rabbits resemble omnivorous species rather than guinea pigs in fat utilization. The higher chlorophyll content of the normal ration was considered responsible for the fat utilization of only 54 percent. Milk fat from cows fed cod-liver oil produced no muscle lesions in guinea pigs. It appeared that melting point rather than saturation were the determining factors in fat utilization by guinea pigs.

The muscle-bone ratio as an index of merit in beef and dual-purpose cattle, O. G. Hankins, B. Knapp, Jr., and R. W. Phillips. (U. S. D. A.). (*Jour. Anim. Sci., 2 (1943), No. 1, pp. 42–49, illus. 2*).—Statistical differences in the muscle: bone ratio of the ninth, tenth, and eleventh ribs of Beef Shorthorn and Milking Shorthorn cows were observed and found to be good indications of the entire carcasses. The mean muscle: bone ratios were 2.55 and 2.28, respectively. Approximately 15.6 percent of the variance was due to type. Differences between the progeny of sires were also significant in both types and accounted for about 22 percent of the total variance. Evidently muscle: bone ratio is a rather definitely inherited character. Correlations of muscle: bone ratio to separable fat in the carcass, live animal measurements, efficiency of gains, and age of steers at slaughter were not significant for either type of cattle. Necessary differences for significance were calculated, and it was determined that more than approximately 10 steer offspring gave little additional information. The study was based on physical analyses of carcasses and measurements and weights of 55 beef and 80 dual-purpose Shorthorn steers slaughtered at approximately 900 lb. live weight.

The ascorbic acid content of ewes' blood, colostrum, and milk and the effect of ascorbic acid injections, G. H. Satterfield, E. A. Bailey, Jr., J. E. Foster, and E. H. Hostetler. (N. C. Expt. Sta.). *Jour. Nutr., 24 (1942), No. 2, pp. 121–129, illus. 2*).—The ascorbic acid content of 80 samples of blood drawn at 3- to 4-week intervals during October to January from 20 bred ewes was found to range from 0.31 to 1.18 mg. per 100 cc. of plasma. Samples from the same individuals taken at different times showed rather wide ranges. Ascorbic acid contents of the colostrum were found to be considerably higher than that of the milk, ranging from 2.01 to 9.94 mg. per 100 cc. of milk before suckling and 0.38 to 1.77 mg. per 100 cc. of milk from the sixth day to the end of lactation. Intramuscular injections of 2 and 5 gm. of ascorbic acid caused increases of 4 and 10 times, respectively, of the ascorbic acid content of the blood, with a return to normal after about 1 day. There was wide variation in the rise of milk ascorbic acid in different animals, with a return to normal within 3 days.

The use of cottonseed meal in the ration of pregnant ewes, H. M. Briggs. (Okla. Expt. Sta.). (*Jour. Anim. Sci., 2 (1943), No. 1, pp. 27–32*).—Although 0.5 lb. of cottonseed meal per head daily seemed toxic for pregnant ewes (E. S. R., 87, p. 101), no harmful effects occurred in pregnant ewes fed 0.25 or 0.5 lb. of cottonseed meal per head daily with alfalfa or prairie hay and oats. In each of 3 yr., 6 groups of about 10 ewes per lot were wintered during gestation. Carotene analysis of the alfalfa and prairie hay showed that the smallest intake of carotene at the peak weight was 83.5 μg. per kilogram of live weight or 38 μg. per pound of gain. Prairie hay was supplemented with finely ground limestone. "The ewes appeared very thrifty, lambed with ordinary labor, and milked well following parturition."

Utilizing self-feeding methods for fattening lambs on sugar beet byproducts and other home-grown feeds, A. S. Ingraham (*Wyoming Sta. Bul. 257 (1942), pp. 27, illus. 1*).—In 3 years' comparisons with lambs on a ration containing whole and ground barley, whole and chopped alfalfa, and wet and dry beet pulp, self-feeding generally increased the rate of gain and decreased the labor involved. Since the consumption of higher priced feeds was generally increased, there were greater costs. Satisfactory gains were produced on lambs with dry beet pulp, indicating its possibilities where wet beet pulp is not available. Beet molasses as a partial substitute for barley did not improve the ration or decrease the cost, although it could be fed when the price was right. The feeding of beet tops in a beet top-straw sandwich was not successful.

Staple length in relation to wool production, E. M. Pohle and H. R. Keller. (U. S. D. A.). (*Jour. Anim. Sci., 2 (1943), No. 1, pp. 33–41, illus. 1*).—With each centimeter increase in the staple length of wool produced by 983 yearling Rambouillet, Targhee, Columbia, and Corriedale ewes raised under intermountain range conditions, there was an average increase of 0.5–0.75 lb. of unscoured wool, 0.25–0.5 lb. of bone dry scoured wool per fleece, and an increase of 0.85–2.52 percent in the yield of clean wool. Fine and ½ Blood wool showed the greatest increase in scoured and unscoured fleece weights for each centimeter increase in length. Length of staple had a greater influence on scoured fleece weight than on unscoured fleece weight or percentage of clean yield. Body weight had a greater influence on unscoured fleece weight than on the weight or percentage of clean wool produced. Because of the relationships of staple length of weanlings to that of yearlings (E. S. R., 87, p. 97), it is suggested that selection and culling may be made at that age with a reasonable degree of accuracy. The data were summarized by staple length groups in each breed.

Saving the pig crop, L. A. Weaver (*Missouri Sta. Cir. 250 (1943), pp. 8, illus. 1*).—General directions for feeding and management of young pigs.

Rearing orphan pigs, V. F. McRoberts and A. G. Hogan (*Missouri Sta. Cir. 253 (1943), pp. 4, illus. 1*).—The principles of feeding orphan pigs and compounding rations from cow's milk for pigs unclaimed by their dams.

The minimum requirement of nicotinic acid for the growing pig, E. H. Hughes. (Univ. Calif.). (*Jour. Anim. Sci., 2 (1943), No. 1, pp. 23–26, illus. 1*).—The requirement of nicotinic acid by the pig was between 5 and 10 mg. per 100 lb. daily. In one experiment in which 5 lots of 5 pigs each received from 0- to 25-mg. supplements of nicotinic acid per 100 lb. per day, there were no differences in the growth rate, but it was noted that molds and yeasts on the floor were licked by the pigs. In a second experiment of 77 days' duration, after the floors were cleaned, additions of 0, 5, 10, and 15 mg. of nicotinic acid per 100 lb. produced average daily gains of 0.36, 0.43, 0.68, and 0.67 lb., respectively. It was assumed that nicotinic acid was synthesized by the molds and yeasts in the first experiment.

Studies with swine on rations extremely low in manganese, S. R. JOHNSON. (Ark. Expt. Sta.). (*Jour. Anim. Sci., 2 (1943), No. 1, pp. 14–22*).—Continuing previous studies (E. S. R., 85, p. 382), pigs grew from weights of about 20 lb. to about 130 lb. in 98 days on a ration containing 0.27 mg. of manganese per kilogram, but reproduction was unsatisfactory. When a green feed supplement (Cerogras) was added to the ration, raising the manganese content to about 6 mg. per kilogram, satisfactory reproduction occurred. Stiffness and irritability of the sows at about 300 lb. in weight was not clearly a manganese deficiency because of the possible effect of some green-feed factor. Analysis of the dried body and liver of the pigs and their dams on the manganese-deficient rations showed the manganese content to vary with the rations, but it appeared unlikely that a deficiency of manganese occurred in normal practice. The studies were conducted with pigs on the very low manganese ration, with Cerogras, and in other cases with supplements of as much as 100 p. p. m. of manganese added to rations.

Lignite coal [and] lignite and wood ash as a mineral for pigs on alfalfa pasture, A. SEVERSON (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 3, pp. 31–32*).—When lignite coal and lignite ash were fed as mineral supplements to lots of 14 pigs for 12 weeks on alfalfa pasture, the daily gain was retarded. Minerals in tankage and pasture proved beneficial.

The relation of ascorbic acid to breeding performance in horses, G. K. DAVIS and C. L. COLE. (Mich. Expt. Sta.). (*Jour. Anim. Sci., 2 (1943), No. 1, pp. 53–58*).—Although individuals varied widely in the content of ascorbic acid in the blood plasma, good breeding mares of the heavy and light breeds averaged 0.15 and 0.13 mg. per 100 cc. of blood plasma, whereas those that were difficult breeders showed only 0.07 and 0.09 mg. of ascorbic acid, respectively, per 100 cc. Similar results were obtained with a stallion. The sperm count of the semen and motility of the sperm were increased by subcutaneous and oral administration of ascorbic acid. Blood ascorbic acid determinations showed an increase in the ascorbic acid during the pasturing season. Blood ascorbic acid determinations of 19 geldings showed average values of 0.07 mg. per 100 cc of plasma.

The riboflavin requirement of the dog, R. L. POTTER, A. E. AXELROD, and C. A. ELVEHJEM. (Wis. Expt. Sta.). (*Jour. Nutr., 24 (1942), No. 5, pp. 449–460, illus. 2*).—The riboflavin requirement of the growing dog was between 60 and 100 µg. per kilogram of body weight per day. There were employed in the study eight dogs fed after 6–7 weeks of age for 40–99 days, one-half on high carbohydrate rations and one-half on high fat rations. In these rations, 24 parts of lard replaced 36 parts of sucrose and 8 parts of cottonseed oil. The supplements of riboflavin for different dogs varied from 0 to 100 µg. per kilogram of body weight for animals weighed daily. Urinary riboflavin excretion was ascertained while the riboflavin supplements were being fed. Characteristic symptoms of riboflavin deficiencies are described.

The digestibility of some high protein feeds by foxes, S. E. SMITH. (Cornell Univ.). (*Arch. Biochem., 1 (1942), No. 2, pp. 263–267*).—In digestion trials of 5 days' duration with three adult foxes on rations containing different sources of proteins, the proteins ranked in the order of frozen horse meat 91 percent, followed by fish meal, liver meal, meat scrap, soybean meal, and linseed meal, with the proteins of blood meal only 77.7 percent digestible.

Number of feathers on different breeds and varieties, R. G. JAAP and K. TURNER. (Okla. Expt. Sta.). (*U. S. Egg and Poultry Mag., 49 (1943), No. 2, pp. 74–75, 90–94, illus. 1*).—The feather number per pound of body weight tended to be greater in the smaller breeds than in the larger ones. The feathers of the Dark Cornish were shorter, lighter in weight, and narrower than those of the

American class breeds. The crossbreds' feathers tended to be short like the Cornish parent, but in width almost as great as the Rhode Island Reds. The study was based on the weights and measurements of feathers from five male individuals each of the Dark Cornish Bantam, Dark Cornish, Cornish × Rhode Island Red cross, Rhode Island Red, Barred Plymouth Rock, White Plymouth Rock, and White Wyandotte breeds.

Emergency measures in increasing poultry production in the food for war program, G. P. Goodearl (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 3, pp. 15–17*).—There are mentioned in connection with the increased production program better housing facilities, the use of dry litter, better feeding, and lights.

Rations for growth of chickens, D. C. Kennard and V. D. Chamberlin (*Ohio Sta. Bimo. Bul. 220 (1943), pp. 8–12*).—In 9 weeks' growth of Single-Comb White Leghorn and Rhode Island Red chicks of both sexes, comparable results as to the feed consumption and growth were obtained on five rations differing in the proportions of whole corn, wheat, and oats with mashes varying in the percentages of cereal byproducts and proteins. It was recommended that a practical ration be chosen from feeds available provided 20 percent of oats was used to prevent feather picking and cannibalism. Whole wheat was as satisfactory in the scratch as whole corn, and coarsely ground wheat satisfactorily replaced bran and middlings.

Studies on the use of dehydrated sweet potato meal in chick rations, A. D. Tillman and H. J. Davis (*Louisiana Sta. Bul. 358 (1943), pp. 12*).—It was found that sweetpotato meal could be used as 20–25 percent of the mash mixture and replace carbohydrate feeds in chick rations. The results were based on three series of experiments in which lots of White Plymouth Rock or Rhode Island Red chicks were fed on rations containing 10–40 percent sweetpotato meal in comparison with rations containing different amounts or no yellow corn, wheat bran or shorts, pulverized oats, and rice bran or polish. Data were recorded on the weights of chicks at 8–10 weeks of age, feed required per unit of gain, and comparisons with a standard ration. There were employed in the study 2,200 day-old chicks with the rations of 18–19 percent protein.

Factors required by chicks maintained on a heated diet, H. A. Waisman, R. C. Mills, and C. A. Elvehjem. (Wis. Expt. Sta.). (*Jour. Nutr., 24 (1942), No. 2, pp. 187–198*).—The amount of calcium pantothenate required to prevent dermatitis in chicks at 4 weeks was approximately one-half that needed for maximum growth on a heated diet. Added growth due to the U factor (E. S. R., 80, p. 90) and cartilage was obtained only when the panthothenic acid was made available. Added biotin was also required for growth on the heated diet. Dry heating the grain and casein destroyed biotin, panthothenic acid, and the eluate factor (U) present in these materials. It appeared that as supplements to the heated ration there were required for normal growth biotin, cartilage, factor U, and pantothenic acid. The absence of any one caused a reduction in growth rate. In the conduct of the study, groups of at least six chicks were fed to 4 weeks of age on the heated diet with supplements in different amounts fed singly and in combination per 100 gm. of the ration. These supplements included pantothenic acid, cartilage, biotin, solubilized liver extract (U factor), vitamin K, inositol, and molasses. Biotin and one or more portions of factor U were furnished by liver residue.

Pyridoxine deficiency in chicks, S. Lepkovsky and F. H. Kratzer. (Univ. Calif.). (*Jour. Nutr., 24 (1942), No. 6, pp. 515–521, illus. 1*).—Chicks on a pyridoxine-deficient diet were found to show slow growth, convulsions, and other related abnormal conditions. When 2 mg. of pyridoxine per kilogram of the ration were added, the growth rate was doubled and there were no convulsions, although these began in some chicks on the basal ration at 12 days. The study was conducted with 10 groups of 81 pyridoxine-deficient chicks and 10 groups of 58 chicks with the pyridoxine supplement. The pyridoxine-deficient ration was prepared by water and fuller's earth extraction of the feeds.

Use of pure riboflavin in poultry starting mashes, D. R. Clandinin, H. N. Woodsworth, C. W. Traves, and W. Henderson (*U. S. Egg and Poultry Mag., 49 (1943), No. 2, pp. 82–84, illus. 1*).—Chicks on a ration of cereals, protein supplements, and minerals made good growth to 4 weeks of age and developed no cases of curled-toe paralysis when 5 percent of buttermilk powder or amounts of riboflavin estimated to be present in the buttermilk were added. Without either there was less growth and cases of curled-toe paralysis developed. The study was conducted with three lots of 25 male and female chicks each on rations with and without buttermilk powder and riboflavin. The substitution of synthetic riboflavin for buttermilk powder was considered more economical.

Shell treatment of eggs by oiling, II, III, R. J. Evans. (Wash. Expt. Sta.). (*U. S. Egg and Poultry Mag., 48 (1942), No. 11, pp. 596–599; 49 (1943), No. 2, pp. 78–79, 96, illus. 1*).—A continuation of the series (E. S. R., 88, p. 805):

II. *Effect of diluting the oil and of using oil with different physical properties on the interior quality of shell eggs.*—In the use of oils in different solvents and when variations in physical qualities were noted, dilutions with 80–90 percent of a volatile solvent reduced the effectiveness of the oil in preventing loss of albumen index or gain in air cell size of egg. The interior quality of treated eggs was better preserved during storage when the viscosity of the oil was maintained.

III. *Estimation of deterioration in stored eggs.*—There was a correlation of +0.464 between the albumen index and the percentage of firm albumen in fresh eggs, but −0.291 between albumen index and percentage of outer thin albumen. The viscosity of the firm albumen was also related to the albumen index. Oiled and unoiled eggs behaved differently as regards keeping qualities, depending on the percentage of outer liquid albumen, percentage of firm albumen, and the albumen index. Oiled eggs appeared better than unoiled eggs. Either the percentage loss of albumen index or the decrease in percentage of firm albumen could be used to estimate deterioration in oiled storage eggs, but the most satisfactory results were obtained by using a combination of the percentage loss in albumen index, decrease in percentage of firm albumen, and increase in percentage of outer liquid albumen.

Lighting of poultry houses uneconomical for hens over one year of age, B. Alder (*Farm and Home Sci.* [*Utah Sta.*], *4 (1943), No. 1, p. 6*).—The use of lights and warming the water of part of 12 pens of 18 one-year-old and older hens each did not increase the total yearly egg production and the percentage of hatchability of the eggs was lowered from 65.4 to 53.5 percent.

DAIRY FARMING—DAIRYING

Meeting war needs for milk production through better pastures, G. Q. Bateman (*Farm and Home Sci.* [*Utah Sta.*], *4 (1943), No. 1, pp. 8–9, 15, illus. 7*).—Increases in the 1942 production of more than 100 percent over the 1941 production of forage on sample areas of pastures were effected by fertilization with 6.8 tons of manure and 200 lb. superphosphate per acre. Similar increases also occurred in the milk and butterfat production. Fertilization increased the carrying capacity an estimated 45 percent.

Effect of spraying cows with repellent type sprays as measured by milk production, A. O. Shaw and F. W. Atkeson. (Kans. Expt. Sta. et al.). (*Jour. Dairy Sci., 26 (1943), No. 2, pp. 179–187, illus. 1*).—Using two groups of 10 cows each, sprayed and unsprayed for stable flies during a 58-day period, the daily average milk production was 34.3 lb. when not sprayed and 35.2 lb. when sprayed. Differences were well within the experimental error range.

Circulatory system of the cow's udder, R. B. Becker and P. T. D. Arnold (*Florida Sta. Bul. 379 (1942), pp. 18, illus. 5*).—In seven additional udders (E. S. R., 78, p. 94), the branches of the internal pudic veins known as the perineal veins were shown to carry venous blood into the mammary venous plexus. In only 1 of 22 cases no valves were found in the veins permitting the flow of blood in the direction of least pressure. Anastomosis of the vessels was less clearly defined for crossing from the left sides of the venous plexus in the anterior than in the posterior part of the udder. The location of the valves was ascertained and diagramed in the seven udders by applying pressure to determine the flow in the veins of freshly dissected specimens.

Relation of the number of leucocytes in milk to streptococcus infections of the bovine udder, G. J. Hucker. (N. Y. State Expt. Sta.) (*Jour. Milk Technol., 5 (1942), No. 6, pp. 323–333*).—A study of 30,331 leucocyte counts of milk samples from 8,000 cows showed that 68 percent of those encountered were under 100,000 per cubic centimeter. The proportion of each 300,000 above this number was progressively decreased. Comparable samples milked by hand and machine showed that the latter had higher leucocyte counts and larger numbers of streptococci than similar samples from cows milked by hand. The farther removed from the cow the less delicate the leucocyte count becomes as an indication of mastitis infection.

The effect of a vitamin A-rich diet on the vitamin A content of the colostrum of dairy cows, J. Stewart and J. W. McCallum (*Jour. Dairy Res. [London], 13 (1942), No. 1, pp. 1–4*).—In the light of previous findings on the value of high vitamin A content in colostrum for the control of white scours (E. S. R., 80, p. 825), study was made of the colostrum of cows receiving 3 lb. of carrots or ½ pt. of cod-liver oil per day in addition to a regular ration from the time the cows came off pasture until pasteurization. Feeding the supplementary carotene and vitamin A had no significant effect on the amounts of vitamin A in the colostrum. These studies were conducted on five farms with 69 cows receiving carrots and 57 cows receiving cod-liver oil. The controls without the supplements in the 2 yr. were based on results with 67 and 50 cows, respectively.

Single service containers for distribution of fluid milk, J. R. Sanborn. (N. Y. State Expt. Sta.). (*Jour. Amer. Vet. Med. Assoc., 101 (1942), No. 789, pp. 477–480*).—The paper container for milk distribution has been found satisfactory for improvements in sanitation and also economical by several agencies guarding the public health.

Bacteriological and practical aspects of paper containers for milk, M. J. Prucha and P. H. Tracy (*Illinois Sta. Bul. 495 (1943), pp. 413–472, illus. 9*).—Finished paper milk containers found on the market were in excellent sanitary condition as shown by a bacteriological examination of 2,607 quart containers made and manufactured in different mills and factories. Paper containers were preferred to glass bottles by many consumers. The hot sealing paraffin was sterile, but the paper from which the containers were made usually had some bacterial spores in it. When the pouring lip of the container was not well covered the milk was contaminated as it was poured out. Bacteria could not penetrate the seams or walls of properly sealed containers even when submerged in a bacterial suspension. When not packed in cases the temperature of the milk in paper bottles changed a little more slowly than in glass bottles. All paper bottles tested stood as much as 80 lb. pressure

Changes involving reduction of ascorbic acid content or development of off-flavors in sunlight took place less rapidly in paper than in glass bottles. There were employed in the studies inoculations to test survival and bacterial counts of cultures of *Serratia marcescens*, *Escherichia coli*, and *Staphylococcus aureus*. The effects of different treatments on the viability of these organisms were made on paper plaques inoculated before and after sealing, pouring, and other treatments. Consideration was also given to the effects of different amounts of paraffin of variable melting points and the acidity of the milk packed therein.

Iodoform flavor in milk, H. G. Lindquist. (Mass. State Col.). (*Jour. Milk Technol., 5 (1942), No. 6, pp. 334–335*).—A popularly designated medicinal or chemical flavor in milk from a 200-gal. batch pasteurizer was traced to milk from one cow which had been treated 1 week previously with iodoform for retained afterbirth.

The pasteurization of milk, G. S. Wilson (*London; Edward Arnold & Co., 1942, pp. 212+*).—This book gives a critical review of the effects of pasteurization on the nutritive value of milk for animals and humans and the relationship to control of milk-borne diseases, especially tuberculosis, undulant fever, and typhoid.

Whole milk powder: Its keeping quality, H. A. Hollender and P. H. Tracy. (Univ. Ill.). (*Dairy Indus., 7 (1942), No 10, pp. 259, 264*).—In a study of tyrosine, hydroquinone, gum guaiac, Avenex, Enzylac, ascorbic acid, sodium citrate, and bacterial starter for controlling oxidized flavors in powdered whole milk with and without copper and stored in different types of containers, all of these products tended to retard the development of oxidized flavor. The most effective antioxidants were gum guaiac and hydroquinone, but an objectionable sweetish flavor developed from the use of the former. The best solubility was obtained with ascorbic acid. Pasteurization at 170° F. proved more satisfactory than at 150° or 190°. Exclusion of air infiltration and lacquering the tin containers aided in retarding oxidation. An objectionable brown discoloration of the powder developed under certain conditions.

Bacteriological aspects of the manufacture of spray-dried milk and whey powders, including some observations concerning moisture content and solubility, E. L. Crossley and W. A. Johnson (*Jour. Dairy Res.* [*London*], *13 (1942), No. 1, pp. 5–44, illus. 2*).—Bacteriological study of 671 samples of freshly made spray-dried milk powders showed the bacterial flora to consist essentially of streptococci and micrococci representing a relatively few species. Aerobic spore formers, *Achromobacter* sp., coliforms, anaerobic spore forms, yeasts, and molds were present only in small numbers. The plate counts of the powders were not directly related to the raw milk count, but they were more directly affected by the presence of thermoduric bacteria in the raw milk. Pasteurization at 160°–170° F. for 3–5 min. proved satisfactory without seriously decreasing solubility of the powder. Spray drying destroyed many pathogens but it could not be relied on. Bacteriological cleanliness of the plant was a vital factor. Plant cleaning seemed desirable every 7–9 hr. Separated milk powders yielded lower counts when performed under satisfactory conditions. Seasonal variations in counts were small when good conditions prevailed. Variations in plate counts of separated, full cream, and whey powders are presented.

Whipping light cream, A. C. Dahlberg (*New York State Sta. Cir. 197 (1943), pp. 4, illus. 2*).—In continuation of studies on whipping heavy cream (E. S. R., 63, p. 670) directions are given for whipping light cream by additions of gelatin and gums.

The relation between the degree of solidification of fat in cream and its churning time.—I, Measurement of the degree of solidification, E. L. Jack and J. R. Brunner. (Univ. Calif.). (*Jour. Dairy Sci., 26 (1943), No. 2, pp.*

169–177, illus. 4).—The percentage of solid fat in cream at various temperatures was shown to vary according to the temperature and length of time it was held. The heat of melting 1 gm. of milk fat between —10° and 60° C. was 19.5 calories. The specific heat of skim milk ranged from 0.943 at 0° to 0.963 at 60°.

Bacteriology of butter cultures: A review, B. W. Hammer and F. J. Babel (Iowa Expt. Sta.). (*Jour. Dairy Sci*, *26* (*1943*), *No. 2, pp. 83–168*).—The literature on the bacteriology of butter cultures is grouped under studies of associative action of organisms in butter cultures and their distribution, variations in strains of lactic acid organisms, factors influencing the growth habits and requirements of flavor-producing organisms, the production of special products in cultures, and the influence of various environmental conditions on the development of flavors, body, and texture in butter.

The problem of bacteriophage in cheese making.—I, Observations and investigations on slow acid production, E. B. Anderson and L. J. Meanwell (*Jour. Dairy Res.* [*London*], *13* (*1942*), *No. 1, pp. 58–72*).—Evidence is presented that slowness in clotting and failure to produce sufficient acid in cheese manufacture, as noted by Whitehead and Hunter (E. S. R., 85, p. 813), may be caused by the presence of bacteriophage. Drops of infected whey and its presence on equipment were found to result in starter failure. The action of bacteriophage in slow cultures and in other mixed cultures showed its nonspecific nature. The action of the phage was detected by the phage detection test based on the acid development after 6 hr. at 30° and 37° C. Protection of bulk starter from bacteriophage seemed important.

The firmness of rennet curd; its measurement and variations, S. J. Rowland and D. Soulides (*Jour. Dairy Res.* [*London*], *13* (*1942*), *No. 1, pp. 85–92, illus. 1*).—In accordance with the needs indicated by Marquardt and Needham (E. S. R., 85, p. 245), an objective test for measuring the firmness of rennet curd was devised, using samples of 100 cc. of milk which showed variations in the load required to drive a cylindrical weight into the curd after 30 min. in a thermostat at 32° C. The curd firmness was shown to vary with changes in the individual cows, separate quarters of the udder, acidity, changes in calcium chloride, the amounts of rennet, coagulation time, and admixture with soft-curd milk.

The effect of varying pitching point and rate of scald on the physical properties and general quality of cheese made from milk of varying acidity and from pasteurized milk, G. W. Scott Blair, F. M. V. Coppen, and D. V. Dearden (*Jour. Dairy Res.* [*London*], *13* (*1942*), *No. 1, pp. 73–84, illus. 1*).—Study of the firmness and spring of samples of cheese made with 0.25 and 2.5 percent starter ripened for 0.5 and 1 hr., respectively, at different temperatures, continuing previous studies (E. S. R., 85, p. 813), showed pitching consistency to be much more marked in its effect than the rate of scald. Many physical properties which were rated by cheese makers were correlated with pitching consistency. In sweet-curd cheese the most important properties were highly correlated with one another and with the results obtained in physical tests. With the more acid curds, cheese experts showed little differences from nonexperts in the correlation of the physical properties with the general quality of the product.

Gas production by Cheddar and Limburger cheeses ripened in tin cans, F. L. Dorn and A. C. Dahlberg (*New York State Sta. Tech. Bul. 266* (*1942*), *pp. 33, illus. 10*).—During studies of Cheddar, Limburger, and other cheese production in cans (E. S. R., 88, p. 521) the gas was probably evolved chiefly by the action of bacterial enzymes on the proteins. It was in smaller amounts but more uniform when the cheese was made from pasteurized milk of high quality than when raw milk was employed.

The gas evolved by 12 oz. of Cheddar cheese in 44 weeks at 50° F. was calculated at 121–197 cc. from pasteurized milk and 307–491 cc. from raw milk at the same temperature. Gas production caused a loss in weight of the cheese, due largely to the formation of carbon dioxide.

The production of gas was greater in Limburger cheese than in Cheddar. The gases in Limburger consisted mainly of carbon dioxide with small amounts of hydrogen and (in the partially ripened curd) traces of hydrogen sulfide. The steam distillate contained ammonia and indole. The volatile fatty acids in the ripened cheese were largely higher fatty acids from fat hydrolysis.

Use of soybean flour in an ice cream mix, A. D. Burke and D. Flanagan. (Ala. Polytech. Inst.). (*Ice Cream Rev., 26 (1943), No. 8, pp. 14–15, 54, 56–57, illus. 1*).—A 20-percent replacement by soybean flour of the dry skim milk powder amounting to a total of 4.5 percent in the ice cream mix produced a satisfactory product as judged by the dairy department and several students. A 40-percent replacement of the serum solids had too much of the soybean flavor, which tended to submerge the vanilla flavor and sweetness. Doubling the amount of vanilla did not avoid the soybean flavor, which to some individuals was objectionable. The soybean flour slightly improved the texture of the ice cream, and all the samples in which soybean flour was utilized melted to a smooth creamy consistency.

VETERINARY MEDICINE

Some studies of three pathogenic fungi isolated from animals, D. E. Madsen. (Utah Expt. Sta.). (*Cornell Vet., 32 (1942), No. 4, pp. 383–389, illus. 8*).—It is pointed out that fibrous and purulent granulomatus lesions are not infrequent in domestic animals, and in many cases their etiology has not received extended investigation. Since tuberculosis of animals is now generally less extensive than formerly, it seems likely that pathogenic fungi will assume more etiological significance in connection with the diagnosis of such infectious granulomas.

Report is made of the morphology and growth characteristics of an *Actinomyces*, isolated from a dog; a *Cryptococcus*, isolated from two guinea pigs that had received inoculations of purulent lymph glands from a cow; and a *Blastomyces*, isolated from a dog. It was found that the rather long period of cultivation on laboratory media influenced adversely the pathogenicity of the *Cryptococcus* and *Blastomyces* organisms for experimental animals. The study indicated that the *Actinomyces* organism is identical with that originally isolated from a dog.

Methods of investigation on the life cycles of avian schistosomes, P. C. Beaver and D. B. McMullen (*Jour. Parasitol., 28 (1942), No. 6, Sup., p. 13*).

Symptoms and immunity following graduated doses of Eimeria tenella, H. A. Jankiewicz (*Jour. Parasitol., 28 (1942), No. 6, Sup., p. 23*).

Notes on the musculature of the male genitalia of Haemonchus contortus, W. L. Threlkeld and M. E. Henderson. (Va. Expt. Sta.). (*Jour. Parasitol., 28 (1942), No. 5, pp. 351–360, illus. 22*).

A comparative study of the nutritional requirements of Salmonella typhosa, Salmonella pullorum, and Salmonella gallinarum, E. A. Johnson and L. F. Rettger (*Jour. Bact., 45 (1943), No. 2, pp. 127–135*).—Report is made of work conducted with the primary purpose of examining various strains of *S. pullorum*, *S. gallinarum*, and *S. typhosa* for their vitamin, tryptophan, and glucose requirements in a chemically defined basal medium of 16 amino acids with added thioglycolic acid. "After eliminating 3 strains of *S. pullorum* and

5 of *S. gallinarum* which failed to grow in the complete synthetic medium, 45 strains of *S. pullorum*, 22 of *S. gallinarum*, and 9 of *S. typhosa* were employed in the comparative study. *S. pullorum* was the most variable of the 3 species in nutritional requirements. Two of the 45 strains were found to demand nicotinic acid or its amide, while the remainder of the strains did not need any vitamins. The glucose requirements were also variable. Most strains failed to grow without glucose; some were indifferent, and a few were near the border line. Glucose was definitely stimulative in all cases. The response to amino acids was much more variable among strains of this species than it was for the other 2.

"These observations indicate that different strains of *S. pullorum* have varying degrees of vigor and ability to utilize nutritionally important substances. *S. typhosa* and *S. gallinarum* have fairly definite requirements, and both are more vigorous in their growth-producing abilities than is *S. pullorum*. *S. gallinarum* was the only organism of the 3 which showed a definite requirement for an accessory growth factor. All of the 22 strains demanded vitamin B_1 for growth. The absence of glucose caused no observable diminution in growth, and glucose was therefore deemed nonessential. Eight cultures of *S. gallinarum* required incubation in an atmosphere of 10 percent CO_2. None of the *S. typhosa* and *S. pullorum* strains needed added CO_2 for their development. Tryptophan was not necessary for any of the strains of *S. pullorum* and *S. gallinarum*. This furnishes an interesting point of difference between these 2 organisms and *S. typhosa*, which required tryptophan. The importance of employing chemically pure (synthetic, when possible) amino acids, etc., in a chemically defined medium was regarded as essential in this work."

A list of 24 references to the literature is included.

A new thermostabile medium for the prolonged bacteria-free cultivation of Trichomonas foetus, M. D. SCHNEIDER (*Jour. Parasitol.*, *28* (*1942*), *No. 5*, *pp. 428–429*).

Inoculations of Trichomonas foetus (Protozoa) in guinea pigs, B. B. MORGAN. (Univ. Wis.) (*Jour. Parasitol.*, *28* (*1942*), *No. 6*, *Sup.*, *p. 15*).

Studies in the epidemiology of Q fever.—XI, Experimental infection of the ticks Haemaphysalis bispinosa and Ornithodorus sp. with Rickettsia burneti, D. J. W. SMITH (*Austral. Jour. Expt. Biol. and Med. Sci.*, *20* (*1942*), *No. 4*, *pp. 295–296*).—A continuation of these studies (E. S. R., 88, p. 525).

Rocky Mountain spotted fever: Duration of potency of tick-tissue vaccine, R. R. PARKER and E. A. STEINHAUS (*Pub. Health Rpts.* [*U. S.*], *58* (*1943*), *No. 6*, *pp 230–232*).

Preservation of dried equine encephalomyelitis virus in vacuum-sealed tubes, M. S. SHAHAN. (U. S. D. A.). (*Jour. Amer. Vet. Med. Assoc.*, *102* (*1943*), *No. 792*, *p. 216*).—The author reports further (E. S. R., 85, p. 538) upon the infectivity of equine encephalomyelitis virus after being held in sealed vacuum tubes for a long period. Both strains after intracerebral passages in guinea pigs and passages in chicken embryos were dried in embryo tissue over phosphorus pentoxide in a vacuum jar and, after desiccation, sealed in vacuum tubes. The western strain was injected intracerebrally into guinea pigs after 3 years and 7 months' storage in the refrigerator and found to be fully active. The eastern strain was injected intracerebrally into guinea pigs after storage for 3 yr. and 1 mo. in the refrigerator and likewise found to be fully virulent.

The course of experimental infection of the chick embryo with the virus of equine encephalomyelitis, F. B. BANG (*Jour. Expt. Med.*, *77* (*1943*), *No. 4*, *pp. 337–344*, *illus. 3*).—"The titration curve for the virus of eastern equine encephalomyelitis inoculated into the 10-day-old chick embryo shows that the maximum increase in virus content continues until shortly before the generalized destruction of the embryo is apparent. This is followed by a stationary phase. Histological studies of infected embryos fail to demonstrate selective tissue destruction, and titrations show the virus to be distributed throughout the egg, although concentrated in the embryo. The chorioallantoic membrane gradually becomes increasingly resistant with age to both the eastern and western viruses. Increased resistance with age is also apparent in the hatched chick. These findings are based on the use of the chick embryo itself as the test animal to determine the 50-percent mortality end point. The limits of accuracy of this method are defined."

Induced resistance of the central nervous system to experimental infection with equine encephalomyelitis virus.—II, Serotherapy in western virus infection, P. K. Olitsky, R. W. Schlesinger, and I. M. Morgan (*Jour. Expt. Med., 77 (1943), No. 4, pp. 359–374, illus. 2*).—A continuation of this work (E. S. R., 88, p. 386).

Studies on the hemorrhagic sweet clover disease, VIII, X, XI (*Jour. Biol. Chem., 145 (1942), No. 1, pp. 155–162, illus. 4; 146 (1942), No. 1, pp. 7–14; 147 (1943), No. 2, pp. 463–474, illus. 1*).—In these further contributions (E. S. R., 88, p. 817), of which the ninth is noted below, the effect of 2-methyl-1,4 naphthoquinone and *l*-ascorbic acid upon the action of 3,3′-methylenebis(4-hydroxycoumarin) on the prothrombin time of rabbits is reported upon by R. S. Overman, M. A. Stahmann, and K. P. Link in part 8 (Wis. Expt. Sta. coop. U. S. D. A.); induced vitamin C excretion in the rat and its effect on the hypoprothrombinemia caused by 3,3′-methylenebis(4-hydroxycoumarin) by C. A. Baumann, J. B. Field, R. S. Overman, and K. P. Link in part 10; and hypoprothrombinemia in the rat induced by salicylic acid by K. P. Link, R. S. Overman, W. R. Sullivan, C. F. Huebner, and L. D. Scheel in part 11 (both 10 and 11 Wis. Sta.)

Studies on the hemorrhagic sweet clover disease.—IX, The effect of diet and vitamin K on the hypoprothrombinemia induced by 3,3′-methylenebis (4-hydroxycoumarin) in the rat, R. S. Overman, J. B. Field, C. A. Baumann, and K. P. Link. (Wis. Expt. Sta. coop. U. S. D. A.). (*Jour. Nutr., 23 (1942), No. 6, pp. 589–602, illus. 1*).—In this further contribution on sweetclover disease (see above) resulting from the ingestion of improperly cured sweetclover hay or silage the ingestion of 3,3′-methylenebis (4-hydroxycoumarin) was found to induce a hypoprothrombinemia in rats. "A single dose of 2.5 mg. to an adult rat lowered the prothrombin activity to 22 percent of normal in 24 hr., when maximum lowering was observed. The maximum effectiveness of the anticoagulant was observed on rations low in vitamin K. Factors which counteracted the anticoagulant were present in a grain ration, in fish meal, and in alfalfa. The factor in alfalfa could be extracted with petroleum ether. Vitamin K counteracted the hypoprothombinemia induced by the anticoagulant, whether given before the anticoagulant, with it, or 12 hr. later. All forms of the vitamin studied were active: 2-methyl 1,4-naphthoquinone, 2-methyl 1,4-naphthohydroquinone diacetate, vitamin K_4, and the water-soluble 2-methyl 1,4-naphthohydroquinone 3 sodium sulfonate. The continued administration of the anticoagulant resulted in severe spontaneous hemorrhages which caused the death of the animals. Their survival times could be prolonged by the ingestion of vitamin K but not by such dietary supplements as choline, ascorbic acid, wheat germ oil, hydrogenated fat, or condensed milk."

The similarity of cytoplasmic inclusions in infant pneumonitis and bovine epithelial cells, J. Broadhurst, M. E. Maclean, and E. H. Peterson (*Cornell Vet., 32 (1942), No. 4, pp. 390–394, illus. 10*).

Tests for a hemolytic substance in Chabertia ovina W. L. Threlkeld. (Va. Expt. Sta.). (*Jour. Parasitol., 28 (1942), No. 6, Sup., p. 27*).

A study of the germicidal and bacteriostatic properties of some commonly used antiseptics in combination with astringent substances, J. B. Sprowls and C. F. Poe (*Jour. Amer. Pharm. Assoc., Sci. Ed., 32 (1943), No. 2, pp. 33–40*).

Toxicity and efficacy of penicillin, H. J. Robinson (*Jour. Pharmacol. and Expt. Ther., 77 (1943), No. 1, pp. 70–79*).—Crude penicillin was found toxic for mice when given intravenously in single doses of 0.5, 1.0, 1.5, and 2.0 gm. per kilogram. More highly purified preparations appeared to be less toxic than the crude preparation when compared on a weight basis. When given subcutaneously penicillin is well tolerated by mice in daily doses of 1.6 gm. per kilogram over a 5-day period. Under the same conditions 3.2 gm. per kilogram are lethal for some mice. The toxic dose of crude penicillin appears to be about 64 times the effective dose as determined by subcutaneous injection in mice. On the basis of weight, penicillin appears to be more effective than sulfanilamide and its derivatives in streptococcal, pneumococcal, and staphylococcal infections in mice. Penicillin had no apparent effect in experimental infections caused by *Mycobacterium tuberculosis, Trypanosoma equiperdum,* or the influenza virus PRS.

Studies on phenothiazine.—XI, The excretion of phenothiazone, F. DeEds and J. O. Thomas. (U. S. D. A.). (*Jour. Parasitol., 28 (1942), No. 5, pp. 363–367*).—Reporting further (E. S. R., 86, p. 678), evidence is presented to show that the reversible oxidation-reduction system phenothiazone-leucophenothiazone, as well as thionol-leucothionol, occurs in the urines of rats, rabbits, and humans receiving phenothiazine. The validity of potentiometric identification of a reversible oxidation-reduction system is discussed. The melting point of leucophenothiazone is shown to be 172°–173° C. Samples of leucophenothiazone isolated from rat, rabbit, and human urines were identified by their melting points, namely, 172°–173°, and by their mixed melting points with synthetic leucophenothiazone. Leucothionol oxidizes so rapidly that it has been impracticable to obtain its melting point. It is suggested that a compound isolated from the urine of a phenothiazine-dosed sheep by another worker was leucophenothiazone and not phenothiazine.

Sulfanilamide ointment in veterinary surgery, J. W. Britton. (Univ. Calif.). (*Cornell Vet., 32 (1942), No. 4, pp. 345–351*).—Sixteen cases of abscesses, lacerated wounds, and infected operative wounds are reported to have been treated effectively with 5-percent sulfanilamide ointment. Four cases of equine pododermatitis, and hair root infection responded with fair success to sulfanilamide ointment therapy, while 6 cases of skin abrasions, dermatitis, and minor lacerations failed to respond satisfactorily.

The effect of bactericidal agents on gram-negative cocci, C. M. Downs (*Jour. Bact., 45 (1943), No. 2, pp. 137–142*).—"Tyrocidine exhibits a bactericidal and bacteriostatic effect against the gram-negative cocci to a greater degree than gramicidin. The inhibitory effect of mucin on tyrothricin has made it impossible to test the protective effect of the antibacterial agent against infection with meningococci. Neutral solution of gastric mucin markedly inhibits the bactericidal effect in vitro of tyrothricin on meningococci and pneumococci."

Bovine abortion apparently due to Listeria infection, W. M. Evans and J. E. Sawyer. (Cornell Univ. et al.). (*Cornell Vet., 32 (1942), No. 4, pp. 448–449*).—A report of an apparent *Listeria* infection in a 4-year-old Jersey which aborted in her first gestation period.

Some preliminary experiments on a skin test for immunity to the stomach worm Haemonchus contortus in the calf, R. L. Mayhew. (La. State Univ.). (*Jour. Parasitol., 28 (1942), No. 6, Sup., p. 20*).

Phenothiazine: New treatment for cattle hookworms, W. C. Cowsert and V. R. Berliner (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 2, p. 8*).—The administration of phenothiazine in the treatment of cattle hookworms was found effective in work with the Mississippi College herd. The dosage now recommended is 20 gm. of phenothiazine for each 100 lb. of weight but should not exceed 80 gm. (2⅔ oz.) in animals weighing over 400 lb. It can be given either in capsules or as a drench in suspended form.

Bovine mastitis (garget), J. O. Foss (*North Dakota Sta. Bimo. Bul.*, *5* (*1943*), *No. 3, pp. 27–30*).—A practical account dealing particularly with herd management and mastitis control.

Further observations on the modified Whiteside test for the detection of chronic bovine mastitis, J. M. Murphy. (N. J. Expt. Stas.). (*Cornell Vet.*, *32* (*1942*), *No. 4, pp. 439–444*).—In further work (E. S. R., 84, p. 818) the modified Whiteside test was found to give as good results in the detection of chronic bovine mastitis when applied to fresh milk as to refrigerated milk if "2 drops of N. NaOH (instead of 1 drop) are used with each 5 drops of fresh milk. The 2:5 ratio should not be used on refrigerated milk as it results in a greater number of false positive reactions than the 1:5 ratio. Unlike most indirect mastitis tests, the modified Whiteside test may be successfully applied to both composite foremilk and bucket milk. Each step away from the use of strict foremilk naturally reduces the number of positive reactions, but this reduction is not in proportion to the amount of dilution."

Streptococcus agalactiae agglutinins in bovine blood serum and whey, W. N. Plastridge and L. Cunningham. ([Conn.] Storrs Expt. Sta.). (*Jour. Bact.*, *43* (*1942*), *No. 6, pp. 779–780*).

The necessity for the standardization of tuberculins for cattle-testing, J. R. McCarter and E. G. Hastings. (Univ. Wis.). (*Jour. Bact.*, *45* (*1943*), *No. 1, pp. 69–70*).

Observations on Vibrio foetus infection in cattle, W. N. Plastridge and L. F. Williams. ([Conn.] Storrs Expt. Sta.). (*Jour. Amer. Vet. Med. Assoc.*, *102* (*1943*), *No. 791, pp. 89–95*).—In reporting further (E. S. R., 86, p. 681), the results of a study of the growth requirements of *V. foetus* and the occurrence and significance of its agglutinins in the blood are considered. Conditions favorable for growth of six freshly isolated strains of *V. foetus* of bovine origin were supplied by a soft agar medium consisting of liver infusion, 1 percent peptone, and 0.3 percent agar, and adjusted to pH 7.4, and by an atmosphere consisting of 10 percent CO_2 and 90 percent air. In nine aborted fetuses and blood samples from the aborting cows *V. foetus* infection was detected in five by direct microscopic examination of stomach fluid, in six by cultural methods, and in eight by the agglutination test. It is concluded that all three procedures should be employed in diagnosing abortions caused by this organism. A study of the agglutination titer of the blood serum of seven cows which aborted *V. foetus*-infected fetuses indicates that an agglutination titer of 1:50 or less should be classed as negative, 1:100 as suspicious, and 1:200 or higher as positive. The authors are led to conclude that the agglutination test is of value in diagnosing abortions due to *V. foetus* and in determining the probable presence of *V. foetus* infection in a herd of cattle, that abortions due to *V. foetus* usually occur during the fifth, sixth, and seventh months of pregnancy, and that *V. foetus* infection in cattle tends to be self-limiting because of the transitory nature of infection and a tendency for initial infection to increase resistance to subsequent exposure.

Rabies in sheep, J. H. Rietz. (W. Va. Univ.). (*Jour. Amer. Vet. Med. Assoc.*, *102* (*1943*), *No. 792, pp. 213–214*).—Report is made of an outbreak of rabies that occurred in a West Virginia flock of 65 lambs attacked by 4 dogs.

Twenty-one succumbed to the disease. Whether more than 1 of these dogs was rabid was not determined.

Active immunization of sheep against large single test infections of Haemonchus contortus, N. R. Stoll (*Jour. Parasitol., 28 (1942), No. 6, Sup., p. 20*).

Effects of the nematode Trichostrongylus colubriformis on the nutrition of lambs, J. S. Andrews, W. R. Kauffman, and R. E. Davis. (U. S. D. A.). (*Jour. Parasitol., 28 (1942), No. 6, Sup., pp. 22–23*).

The control of parasitism in sheep with phenothiazine in a salt lick, J. W. Britton, R. F. Miller, and H. S. Cameron. (Univ. Calif.). (*Cornell Vet., 32 (1942), No. 4, pp. 400–406*).—Report is made of observations of the toxic and anthelmintic effect of a mixture of 1 part phenothiazine and 15 parts salt administered as a salt lick to lambs on irrigated Ladino clover, the lambs having been concentrated on relatively small areas where parasitism is the most serious disease factor. The mass administration of this mixture was nontoxic when given over a period of 78 days. Preliminary tests indicate that this method is effective in controlling stomach worms, the chief parasites of this area. A theory as to the mode of action of the repeated small dose method of administration is advanced.

The effect of varying doses of a commercial phenothiazine upon lambs, W. D. McNally (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 792, pp. 170–175, illus. 2*).—The experiment reported has shown that phenothiazine can be given safely to lambs several times during the year without ill effect, but when given oftener than once in 2 weeks for months at a time it will cause pathological changes in the kidneys. The blood study reveals a tendency to a polycythemia in the more frequent dosage and a predisposition to an agranulocytosis in those receiving one bolus or more a week.

The effect of phenothiazine on pregnant goats and their offspring, R. T. Habermann. (U. S. D. A.). (*Vet. Med., 38 (1943), No. 3, pp. 96–99, illus. 3*).—In the experiments reported a goat and a kid were uninjured by the daily consumption of 15 gm. of phenothiazine mixed in the moistened grain for a period of 12 days. Another goat and her first kid, in an unusual case of superfetation, were not harmfully affected by consuming 15 gm. of phenothiazine daily in a moistened grain mixture for 12 days and, following the birth of her second kid, she and her two kids were uninjured by consuming the medicated mixture for 15 additional days. Four pregnant goats were uninjured by the administration of two therapeutic doses of phenothiazine, and three pregnant goats and their kids were not affected by three therapeutic doses of the anthelmintic.

Hydronephrosis in swine, A. G. Karlson and H. C. H. Kernkamp. (Minn. Expt. Sta.) (*Vet. Student, 4 (1941), No. 1, pp. 18–20, 34, illus. 1; abs. in Minnesota Sta. Rpt. 1942, p. 44*).—A review of the literature is followed by a report of two cases of hydronephrosis in swine.

Studies on baby pig mortality.—III, A note on experimental insulin hypoglycemia in the pig, J. Sampson and R. Graham. (Univ. Ill.). (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 792, pp. 176–179, illus. 1*).—In continuation of this work (E. S. R., 86, p. 832), the deleterious effects of severe and prolonged insulin hypoglycemia were studied in young pigs. The most common symptoms observed following the injection of pigs with insulin were listlessness, convulsions, and coma. So-called irreversible or hyperglycemic insulin coma is likely to develop in pigs that are maintained in comatose hypoglycemia for more than 4 hr. Injections of glucose hasten the recovery from hypoglycemia of short duration but frequently have little value in prolonged hypoglycemia. Severe and protracted insulin hypoglycemia in young pigs may cause other deleterious effects such as respiratory failure, impairment of vision, incoordination, and disturbances of the emotional complex. It is considered reasonable to assume that the experimental results obtained in this study may possibly explain the failure of many newborn pigs affected with so-called "baby pig disease" to respond favorably to injections of glucose.

Survival on soil of oöcysts of two species of swine coccidia, Eimeria debliecki and E. scabra, J. L. Avery. (U. S. D. A.). (*Jour. Parasitol., 28 (1942), No. 6, Sup., pp. 27–28*).

The effect of moderately low temperatures on the sporulation of oöcysts of two species of swine coccidia [Eimeria debliecki and E. scabra], J. L. Avery. (U. S. D. A.). (*Jour. Parasitol., 28 (1942), No 6, Sup., p. 28*).

Minimum heat treatment required for the destruction of Trichinae in pork scraps in garbage, W. H. Wright and J. Bozicevich (*Jour. Parasitol., 28 (1942), No. 6, Sup., p. 17*).

Evidence of transmission of inapparent (subclinical) form of equine infectious anemia by mosquitoes (Psorophora columbiae) and by injection of the virus in extremely high dilution, C. D. Stein, J. C. Lotze, and L. O. Mott. (U. S. D. A.). (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 792, pp. 163–169, illus. 4*).—The evidence presented indicates that infectious anemia in an inapparent (subclinical) form can be induced in a susceptible horse by the subcutaneous inoculation of 1 cc. of virus in 1:100,000 dilution. One positive case of transmission of the subclinical form by *Psorophora* mosquitoes, *P. columbiae*, is also reported. It is shown that the active form of the disease may be transmitted to susceptible horses by the injection of blood from subclinical cases.

Incidence of worm parasites in a large stud of horses, F. B. Hadley. (Univ. Wis.). (*Vet. Med., 38 (1943), No. 3, pp. 88–90, illus. 6*).

Canine distemper in the American badger, W. H. Armstrong (*Cornell Vet., 32 (1942), No. 4, p. 447*).—The first authentic cases of canine distemper infection in the American badger (*Taxidea taxus*), four in number, which occurred in Colorado, are reported.

The minimum vitamin A requirement of the fox, S. E. Smith. (Cornell Univ. et al.). (*Jour. Nutr., 24 (1942), No. 2, pp. 97–109, illus. 6*).—Experimental vitamin A deficiency in the fox is characterized by nervous disturbances—trembling and "cocking" of the head, periods of whirling and in some cases coma, xerophthalmia, widespread epithelial metaplasia, demyelinization of many nerve fibers, and abortions. The earliest signs of a deficiency of vitamin A are the nervous symptoms. The growth of deficient animals, while good at first, declined in the late stages. No specific effect of avitaminosis A was noted on the quality of the fur. The minimum vitamin A requirement necessary to prevent the occurrence of the nervous symptoms in growing pups lies between 15 and 25 I. U. per kilogram of body weight per day. Storage of vitamin A did not occur in the liver until 50 to 100 I. U. of vitamin A per kilogram per day was fed.

Haemorrhagic enteritis in the arctic blue fox caused by the virus of feline enteritis (preliminary report), C. E. Phillips (*Canad. Jour. Compar. Med. and Vet. Sci., 7 (1943), No. 2, pp. 33–35*).

Tissue vaccine in the control of mink distemper, O. J. Hummon and F. R. Bushnell (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 791, pp. 102–104, illus. 1*).

Observations on the life history of a rabbit cuterebrid, the larvae of which may penetrate the human skin, R. H. Beamer and L. R. Penner. (Univ. Conn. et al.). (*Jour. Parasitol., 28 (1942), No. 6, Sup., p. 25*).

Notes on nematodes from the lungs and frontal sinuses of New York furbearers, F. C. GOBLE and A. H. COOK (*Jour. Parasitol., 28 (1942), No. 6, pp. 451–455, illus. 1*).—Observations on the incidence and identity of the parasites of the lungs and frontal sinuses of fur bearers in New York State are recorded. These include *Capillaria aerophila* and *Crenosoma vulpis* in red and gray foxes, *Skrjabingylus nasicola* and *Filaroides bronchialis* in minks and New York weasels, *S. chitwoodorum* and *Crenosoma zederi* in skunks, and *Crenosoma* sp. in raccoons.

Reservoir hosts of Chagas' disease in the State of Texas: Natural infection of nine-banded armadillo (Dasypus novemcinctus texanus), house mice (Mus musculus), opossum (Didelphis virginiana), and wood rats (Neotoma micropus micropus) with Trypanosoma cruzi in the State of Texas, A. PACKCHANIAN (*Amer. Jour. Trop. Med., 22 (1942), No. 6, pp. 623–631, illus. 4*).—Of a number of small mammals collected in Texas 1 nine-banded armadillo, 8 opossums, 2 house mice, and 32 wood rats were found naturally infected with *T. cruzi.* A double or triple infection with *T. cruzi, T. neotoma,* sarcosporidia, and microfilaria was detected in some of the wood rats.

Bibliography of poultry diseases (*Bibliog. Poultry Diseases, Lab. Workers Pullorum Disease Control* [*New Brunswick, N. J.*], *7* (*1942*), *Nos. 1, pp. 18+; 2, pp. 24+*).—A continuation of this bibliography (E. S. R., 87, p. 118).

A pathological condition of the fowl testis, L. P. DOYLE, G. L. SEARCY, and F. N. ANDREWS. (Ind. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 2, pp. 188–189, illus. 1*).

Studies on certain filtrable viruses.—IV, A note on the immunogenic properties of yolk, albumin, and embryo proper in chick embryos inoculated with fowl pox virus, W. M. THORNING and R. GRAHAM. (Univ. Ill.). (*Poultry Sci., 21 (1942), No. 5, p. 478*).

Studies on susceptibility of chickens to cecal coccidiosis, C. A. HERRICK and S. A. EDGAR. (Univ. Wis.). (*Jour. Parasitol., 28 (1942), No. 6, Sup., p. 23*).

The effect of Ascaris suum extract injections upon chickens infected with Ascaridia lineata, L. L. EISENBRANDT (*Jour. Parasitol., 28 (1942), No. 6, Sup., p. 22*).

A new coccidium pathogenic for chickens, Eimeria brunetti n. sp. (Protozoa: Eimeriidae), P. P. LEVINE (*Cornell Vet., 32 (1942), No. 4, pp. 430–439, illus. 1*).—Under the name *E. brunetti* description is given of a new species of coccidium responsible for an unusual outbreak of coccidiosis in several groups of chickens kept on the laboratory grounds at Ithaca, N. Y., during the summer of 1941. The lesions were of a nature distinctly different from those caused by the seven known species of coccidia which infect chickens. The report includes a description of the organism, the disease it produces, and the record of an outbreak of coccidiosis in a commercial flock. There is a periodicity of oocyst discharge in infections with this organism. The daily oocyst elimination by infected birds regularly reaches its peak between 9 a. m. and 3 p. m. Sulfaguanidine when fed to chickens in the proportion of 0.5 percent of the ration prevented infection by this new species.

Excystation of coccidial [Eimeria tenella] oöcysts of the chicken, P. P. LEVINE (*Jour. Parasitol., 28 (1942), No, 5. pp. 426–428*).

The efficacy of phenothiazine and nicotine-bentonite for the removal of Heterakis gallinae and Ascaridia galli from chickens, J. E. GUTHRIE and P. D. HARWOOD (*Jour. Parasitol., 28 (1942), No. 6, Sup., pp. 24–25*).

The duck as a host for the avian malarias, R. D. MANWELL and A. E. HATHEWAY (*Amer. Jour. Hyg., 37 (1943), No. 2, pp. 153–155*).—The duck appears to be highly resistant to most of the avian species of malaria, but is quite susceptible to *Plasmodium nucleophilum*, *P. circumflexum*, and to certain strains of *P. relictum*, *P. cathemerium*, and *P. elongatum*. Muscovy and Mallard ducks and the domestic turkey as well as the white Peking, which is commonly used, are susceptible to *P. lophurae*. The canary can be given heavy infections with this species as well as with the numerous others for which it has been used hitherto. It is likely that, with further work, the duck may be successfully infected with other species of avian malaria, and that it will become the most useful of experimental hosts for this type of research.

Trichomoniasis of turkeys, D. R. KNIGHT, H. C. McDOUGLE, and A. J. DURANT (*Missouri Sta. Bul. 456 (1942), pp. 8, illus. 4*).—Trichomoniasis of turkeys and chickens, first observed in Missouri several years prior to 1938, has been increasing to an alarming extent, a survey having shown the infection to be present in 35 percent of the turkey flocks. Heavy losses have resulted from the disease. The cecal form is the most prevalent. Experiments show that birds affected with trichomoniasis have a marked depletion of vitamin A, while turkeys fed on a high vitamin A diet are more resistant to the disease. A diet consisting of ground oats, fermented with yeast, and cod-liver oil is reasonably successful for controlling an outbreak, and its palatability may be increased by adding dehydrated alfalfa leaf meal. An aniline dye, gentian violet, is helpful in treating severe cases.

Acquired resistance to the gapeworm Syngamus trachea in the turkey and ring-necked pheasant, L. OLIVIER. (U. S. D. A.). (*Jour. Parasitol, 28 (1942), No. 6, Sup., pp. 20–21*).

AGRICULTURAL ENGINEERING

Studies of the biological environment in treated wood in relation to service life.—I, Changes in the character and amount of 60/40 creosote-coal tar solution and coal tar and the decay resistance of the wood of red oak crossties after three years of service, H. SCHMITZ, S. J. BUCKMAN, and H. VON SCHRENK. (Minn. Expt. Sta.). (*Amer. Wood-Preservers' Assoc. Proc., 37 (1941), pp. 248–297, illus. 7*).—The preservative was extracted from red oak cross ties after 3 yr. of service. It was found that the greatest changes in the chemical and physical characteristics of both 60/40 creosote-coal tar solution and coal tar occurred in the outer ½ in. of the ties, with progressively smaller changes from the outside to the interior. The preservative in the bottom half of the tie changed more than that in the top half, and the 60/40 creosote-coal tar solution changed more than did the coal tar. The toxicities of both the 60/40 creosote-coal tar solution and of the coal tar extracted from the top and bottom outer zones of the ties were much lower than the original toxicities of these preservatives, thus indicating that changes in the preservatives occur rapidly in the outer zones of treated wood. Although the original toxicity of the 60/40 creosote-coal tar solution was considerably higher than that of the coal tar, the toxicities of these preservatives extracted from both the top and bottom outer zones of these ties were approximately equal. Test blocks cut from all except one of the eight ties studied were generally resistant to the test fungi under optimum or nearly optimum conditions for fungus growth.

Mollier diagrams for theoretical alcohol-air and octane-water-air mixtures, R. WIEBE, J. F. SHULTZ, and J. O. PORTER. (U. S. D. A.). (*Indus. and Engin. Chem., 34 (1942), No. 5, pp. 575–580, illus. 4*).—Charts show the thermodynamic quantities necessary to calculate the temperatures, pressures, work, and efficiencies for the possible cycles for mixtures of alcohol-air and octane-water-air (85 lb. of water for each 100 lb. of fuel). Sample calculations show that lower temperatures prevail during the combustion of alcohol-air and octane-water-air than with octane-air mixtures, when full advantage is taken of the heat of vaporization of alcohol and water.

Maximum temperatures during combustion give no indication regarding preignition. According to the data presented, there is no reason why water injection alone should be more beneficial than the injection of an alcohol-water mixture with the identical amount of water.

Save time, fuel, and money by making your tractor work at its full capacity, W. J. Promersberger (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 3. pp. 23–25*).—The author finds that the average farmer loads his tractor to about 75 percent of the rated load when performing common field operations and points out that, in the existing circumstances, all tractors should be operating at rated load. Average values for drawbar pull in pounds at speeds from 2 to 6 m. p. h. in 0.5-mile steps are tabulated, as are also the drafts of various machines in pounds per foot of width. Factors other than tractor speed (mechanical condition of the tractor, tires, the type and condition of the soil, and the topography) are also noted as affecting drawbar pull. Examples of the calculation of suitable loads for given rated horsepowers illustrate the recommended procedure for insuring optimum tractor use.

Drying stored shelled corn by forced ventilation, G. R. Shier, R. C. Miller, and W. A. Junnila (*Ohio Sta. Bimo. Bul. 220 (1943), pp. 28–31, illus. 4*).—It is pointed out that from 14 to 45 percent of the Ohio corn crop each year must be held in storage and would be much improved by shelling, drying, and holding in tight bins. Blower ventilation through slat, perforated, or hardware cloth floors may be carried out without artificial heating in April, May, September, and October, warm sunny days and cool nights providing the best conditions. The blower should be operated continuously in suitable weather and should be stopped late at night or early in the morning to leave the stored corn as cool as possible. In cold, damp winter weather the ventilating air should be heated to from 20° to 25° F. above atmospheric temperature. From 1 to 3 cu. ft. per bushel per minute was found a sufficient air flow, the greater volume rate being preferred because of the more rapid cooling. Cool storage temperatures are more emphasized than are rapid or immediate drying. Corn may be kept from harvest till April by occasional blowing of cold air through it.

Of suitable blowers, the small multivane type delivering about 600 cu. ft. per minute against ⅝ in. back pressure and requiring about ¼-hp. motor is preferred. A plywood blower of the multivane type is partially described and is shown in photographs of the rotor and of the completed machine in its housing. About ½ kw.-hr. per bushel was used in cooling and drying a 300-bu. bin of shelled corn with the home-constructed plywood blower. It is noted that some commercial blowers are more efficient.

Wartime range equipment, D. C. Kennard and V. D. Chamberlin (*Ohio Sta. Bimo. Bul. 220 (1943), pp. 5–7, illus. 2*).—This brief article describes a 5- by 8-ft. shelter, 4 ft. high at the front and 2 ft. at the rear, with slatted floor of 1- by 1-in. strips 1.5 in. apart: a trough and barrel watering set-up mounted on a slat-floored sled; and a feed supply similarly mounted. Except the nails and the barrel hoops, no metal is used in the construction of any of these units.

AGRICULTURAL ECONOMICS

Current Farm Economics, [February 1943] (*Oklahoma Sta., Cur. Farm Econ., 16 (1943), No. 1, pp. 40, illus. 2*).—Included are the usual review of the agricultural situation and the price and purchasing-power data brought down through December 1942, and articles entitled: A Method of Determining Rates for Farm Machine Rent and Custom Work, by E. A. Tucker and P. Nelson (pp. 11–19); Milk Transportation in the Stillwater Area, by A. L. Larson (pp. 19–26); and How Important Is Hired Labor to Oklahoma Agriculture, by R. T McMillan (pp. 26–34).

Parity, parity, parity, J. D. Black (*Cambridge, Mass.: Harvard Com. Res Social Sci., 1942, pp. 367+, illus. 49*).—This book is an outgrowth of a study of the parity problem by the seminar in agricultural, forestry, and land-use policy at Harvard University. In 24 chapters the author presents the story of the parity idea in the United States.

Net farm income and income parity summary, 1910–41 (*U. S. Dept. Agr. Bur. Agr. Econ., 1942, pp. 29+, illus. 5*).—Tables present the basic data used in comparing the income of farm and nonfarm population from 1910 to 1941.

"Although rising prices paid by farmers for commodities and services in 1941, together with increased purchases, resulted in an increase in total production expenditures of approximately 1 billion dollars over 1940, the net income of farm operators from the products of the farm increased 56 percent. Net income to farm operators, before the addition of Government payments, was 6,234 million dollars in 1941, compared with only 4,005 million dollars in 1940. When Government payments to farm operators are included, net income amounted to 6,748 million dollars in 1941 compared with 4,675 million dollars in 1940, and was the highest for any year since 1920 when it amounted to 7,126 million dollars. A part of this increase in net income was in the form of additions to inventory although the net realized income, excluding the changes in inventory, was in itself 42 percent more than in 1940. . . . While it is difficult to compare the changes in income of the different types of workers, because many workers and workers' families have more than one source of income, these index numbers indicate that the income of industrial workers was considerably higher in 1941 than the income of persons on farms from farming or than the income of the rest of the nonfarm population when compared with 1910–14."

State and National production goals for 1943, listed, F. J. Welch (*Miss Farm. Res. [Mississippi Sta.], 6 (1943), No. 2, p. 8*).

Wheat in the third war year: Major developments, 1941–42, M. K. Bennett, H. C. Farnsworth, and R. H. Peirce (*Wheat Studies, Food Res. Inst. [Stanford Univ.], 19 (1942), No. 3, pp. 85–120+, illus. 6*).—"In the four chief exporting countries, supplies were more abundant than ever before, and the major problems of government were to maintain returns to producers, reduce output, and expand nonfood uses. Domestic utilization was of normal volume, while exports were extremely small. These went chiefly to Britain, where strong governmental efforts kept supplies—including war reserves—at a very high level, and bread continued cheap and abundant though darkened in color. Supplies of wheat were also abundant in India, and not unusually low in China, where, however, the more important rice crop was short. Soviet Russia, in her unoccupied territory, also avoided critical general shortage of bread grain, but severe curtailment of consumption must have existed in the occupied regions. Shortage of wheat also characterized Continental Europe, where the crop was poor and overseas imports were mostly shut off by blockade. The shortage was less notable in the Axis powers and the Danube countries than in most of the conquered and some of the neutral areas. The remaining major area of the world where wheat shortage was striking in 1941–42 was the Middle East, in which the crop of 1941 was notably small."

Gearing Texas cotton to war needs, C. A. Bonnen, D. T. Killough, G. W. Pfeiffenberger, W. E. Paulson, M. C. Jaynes, and L. P. Gabbard. (Coop. U. S. D. A.). (*Texas Sta. Bul. 624 (1942), pp. 24, illus. 6*).—It is shown that Texas has the capacity to adjust itself to war needs for cotton in three ways: (1) To increase substantially its good spinning varieties without loss in yield:

(2) to improve upon the relationship between spinning performance and farmers' market price differentials; and (3) to take advantage of the relatively low cost of producing cotton in the State.

An economic appraisal of dry-land farming on the Zuni Plateau, New Mexico, O. E. Goodsell (*U. S. Dept. Agr., Bur. Agr. Econ., 1943, pp. 57+, illus. 10*).—This study of the economic conditions in this grazing and dry-land bean-producing district in western New Mexico discusses the land and its people as to physical environment, type of farming, accessibility to markets, and population; progress from initial settlement to 1940; and estimated future farm incomes under conditions of the 1930's, including possibilities for farm reorganization. An appendix contains considerable statistical data as to crop yields and production of livestock, costs, and farm incomes, and charts showing annual crop production ratings based on seasonal distribution of precipitation at Blackrock, Quemado, and Luna, N. Mex., and Springerville, Ariz.

Farming systems in King and Snohomish Counties, Washington, 1939, W. W. Rufener, O. H. Maughan, B. H. Pubols, E. W. Carlsen, and L. C. Wheeting (*Washington Sta. Bul. 424 (1942), pp. 86, illus. 4*).—This study is based upon 189 detailed farm records obtained from 125 dairy farmers, 36 poultry farmers, 21 truck and berry farmers, and 7 other farmers in King and Snohomish Counties, for the year ended September 30, 1939. The relationships to success or failure in farming in western Washington are shown for soil types, rates of crop and livestock production, types of business, organization of the farms, age and income of operators, and other considerations of importance to the farming enterprise.

The factors most significantly affecting efficiency of dairy farm operation and consequently dairy farm income were soils, size of business, rate of butterfat production per cow, and labor efficiency. Successful poultry farm operation was associated closely with size of business, the rate of egg lay, and labor efficiency. Soils, size of business, and crop yields all significantly affected income from truck and berry farming.

Land values, mortgages, rents, and wheat yields of northern Idaho wheat lands, A. N. Nybroten (*Idaho Sta. Bul. 248 (1942), pp. 19, illus. 6*).—The data used in this study were obtained from Latah, Lewis, and Nez Perce Counties, mainly from county records and 124 questionnaires.

"During the decade 1930–1940 the average interest rate in Latah and Nez Perce counties in loans secured by farm mortgages, and in which the mortgagees were either local banks or individuals, decreased from about 7 percent to slightly over 5 percent. The typical duration of these loans was only 5 yr. Generally the loans made for larger amounts and for longer duration contained lower interest rates. Apparently only a small number of the loans made by local banks and individuals actually financed the purchase of farm land. Poorer lands have been overrated in lending policies, while better lands have been underrated.

"Selling prices correlate very well with the total wheat yields. However, the selling prices do not correlate very well with the probable net income from land to operators. . . . While present market prices are in effect the owner operator has better opportunities on the better land—with a probable return of about 8.7 percent on his land investment on 45-bu. land and only 1.4 percent on 22.5-bu. land. . . . A slight trend toward giving the landlord larger shares on the better land and smaller shares on the poorer land is evident."

Corporations as landlords of Kansas farms, H. Howe. (Coop. U. S. D. A.). (*Kansas Sta., Agr. Econ. Rpt. 17 (1943), pp. 16+*).—"The objective of this report is to show general types of corporate landowners of the State, to explain why they became owners, and to furnish information on their leasing arrangements with tenants. . . . In 1941, 24 out of every 25 corporate farms in Kansas were for sale."

Rental rates for farm machines, M. J. Jones and L. E. Hightower (*Missouri Sta. Cir. 252 (1943), pp. 6*).—Information is given to assist farmers in determining rental rates for machinery and charges for custom work. A table is included showing for different machines the purchase price, average use per year, probable life, and cost per year and hour of operation under Missouri conditions.

Cost of producing [alfalfa and clover] on different soil types in central Indiana, 1941, J. C. Bottum and G. G. Quackenbush (*Indiana Sta., Agr. Econ. Mimeog. Nos. 9 (1942), pp. [4]; 10, pp. [4]; 17, pp. [5]*).—These brief reports deal, respectively, with data obtained on the costs of producing alfalfa on 44 fields; clover hay on 186 fields; and clover pasture and clover hay and pasture on 186 fields.

Effect of production costs on returns from sugar beets, W. L. Ruden and G. H. Lambrecht. (Nebr. Expt. Sta.). (*Agr. Engin., 23 (1942), No. 12, pp. 388–389*).—The average cost of producing sugar beets in the irrigated sections of western Nebraska in 1941 varied from $4.26 to $9.81 per ton as a result of differences in quality of land, crop and soil management, and labor efficiency, the last-named factor having had more effect on costs than either land grade or cultural practices. No land of exceptionally poor quality was included. The information obtained through this survey indicated that some farmers were not obtaining efficient use of labor and other resources in 1941. Complete mechanization of sugar beet production may not help those growers to reduce costs.

Preliminary report on the costs and returns of operating large sugar cane farms in Louisiana, crop year 1941, R. A. Ballinger (*Louisiana Sta. Mimeog. Cir. 31 (1943), pp. 6+, illus. 1*).—This is based on records of 36 farms.

Costs and returns in producing tobacco in Jefferson County, Indiana, 1941, F. V. Smith (*Indiana Sta., Dept. Farm Mangt. Mimeog. No. 5 (1942), pp. 4*).—This is a progress report of the data obtained from 50 farmers relative to the costs and practices in producing tobacco on 53 fields.

Burley tobacco enterprise on upland farms near Douglas Reservoir, L. J. Fenske and C. E. Allred (*Tennessee Sta., Agr. Econ. and Rural Sociol. Dept. Monog. 147 (1943), pp. 39+, illus. 10*).—This is a study of past trends and the present status of the tobacco enterprise in the area affected by the installation of the Douglas Dam and is based on information supplied by 29 farmers selected at random in Jefferson, Sevier, Cocke, and Hamblen Counties as to their 1942 tobacco crop and farms.

The farms on which tobacco data were secured averaged 83.2 acres in size. Of this, 36 percent was in crops. Hay and corn were the chief crops grown from an acreage standpoint, and small grains ranked third. Burley tobacco averaged 0.9 acre per farm. The farms were mostly general farms, all classes of livestock being kept in addition to the several crops grown. In 1942 the average cost of production on Burley tobacco was $192.74 per acre including labor charges. Gross income was $470.68 per acre, leaving net returns of $277.94. Yields averaged 1,148 lb. Production costs ranged from 12 to 34 ct. per pound, and averaged 17 ct. per pound for all farms. Budgets to show the long-run prospects indicate that tobacco averaging 1,000–1,200 lb. per acre would return from 20 to 25 ct. per hour to labor under average price-cost relationships.

Tomato and bean enterprises on upland farms near Douglas Reservoir, L. J. Fenske (*Tennessee Sta., Agr. Econ. and Rural Sociol. Dept. Monog. 146*

(1943), pp. 49+, illus. 13).—The topography and soils, climate, market outlets, etc., of the area are described. Using data for 26 farms producing canning crops in 1942, analysis is made of the land use and crops and livestock produced. A section on the tomato enterprise, based largely on data from 26 farms in 1942, discusses acreage and production trends, tomato yields, production costs, return for labor, labor and materials required, factors affecting yields, returns under different conditions, current problems, etc. The section on the bean enterprise is based chiefly on data from 9 farms in 1942 and discusses the acreage and production trends, production costs, returns for labor, labor and materials required, and returns under different conditions.

A summary of livestock marketing in South Dakota, W. P. Cotton. (Coop. 13 other State expt. stas. and U. S. D. A.). (*South Dakota Sta. Cir. 41 (1942), pp. 20, illus. 41).*—An abbreviated and graphic summary of Bulletin 362 (E. S. R., 88, p. 268).

Poultry and egg marketing in South Dakota, W. P. Cotton and W. O. Wilson (*South Dakota Sta. Bul. 364 (1942), pp. 24, illus. 14).*—The characteristics of the poultry industry in the State are described. Data were secured by questionnaires sent to a random sample of producers and to different types of marketing agencies. The marketing practices of chicken and egg producers, turkey growers, hatcheries, merchants handling poultry and eggs, producing plants, and the cooperative marketing of poultry and eggs are analyzed and discussed. Particular emphasis is given to factors contributing to the quality of the products marketed.

Trends in milk production costs and returns in Indiana, 1910–41, L. E. Slater (*Indiana Sta. Agr. Econ. Mimeog. No. 4 (1942), pp. 32+, illus. 14).*—Information concerning the physical requirements for producing milk in northwestern Indiana in 1940 has been used to estimate the costs and returns in milk production for each year from 1910 to 1941, and for each month from January 1924 to January 1942. The average prices for whole milk in Indiana have then been compared with these estimates of production costs and with factors indicating changes in the demand for dairy products. Special consideration is also given to seasonal costs, returns, and profits.

The average net cost of milk production was $105.58 per cow (or $1.34 per 100 lb. of 3.8-percent milk), and the milk produced by the average cow was worth $130.48. The return per hour of labor spent on cows was 42 ct. and, when labor was charged at 22 ct. per hour, there was a profit of $24.90 per cow. About 70 percent of the gross costs of keeping a cow were for feed and labor (feed 46.8 percent, labor 22.9 percent).

During the period 1910–41, Indiana milk prices averaged about the same as milk costs, and, at any given time, were largely the result of supply and demand conditions. The periods 1923–29 and 1938–41 were most profitable for Indiana dairymen, and the periods 1910–16 and 1932–37 were least profitable. Changes in the profitableness of dairying in Indiana are closely related to the purchasing power of consumers.

[Economic facts pertaining to the fluid milk market in different Indiana cities], C. M. Hardin and T. K. Cowden (*Indiana Sta. Agr. Econ. Mimeog. Nos. 1 (1942), pp. 34+, illus. 12; 2, pp. 30+, illus. 8; 3, pp. 31+, illus. 12; 6, pp. 32+, illus. 11; 7, pp. 32+, illus. 12; 8, pp. 28+, illus. 9; 11, pp. 28+, illus. 9; 12, pp. 31+, illus. 12; 13. pp. 30+, illus. 12; 14, pp. 28+, illus. 10; 15, pp. 15+, illus. 8; 16, pp. 15+, illus. 7; 18, pp. 14+, illus. 7; 19, pp. 14+, illus. 6; 20, pp. 14+, illus. 7; 21, pp. 13+, illus. 6; 22, pp. 13+. illus. 5; 23, pp. 15+, illus. 6; 24, pp. 13+, illus. 6; 25, pp. 13+, illus. 5).*—These mimeographed reports are part of a study dealing with an economic analysis of milk in Indiana, previously noted (E. S. R., 87, p. 291). The supply and utilization of milk and cream in the areas surrounding the fluid milk markets, the receipts and utilization of milk, milk prices, factors affecting the sale of milk, and seasonal variations in the receipts, utilization, and prices are discussed for the individual cities, and comparisons made with other fluid markets of the State, as follows: Nos. 1, Indianapolis; 2, Fort Wayne; 3, Kokomo; 6, South Bend; 7, Evansville; 8, Richmond; 11, Elkhart; 12, Terre Haute; 13, Marion; 14, Logansport; 15, Huntington; 16, Peru; 18, Columbus; 19, Brazil; 20, Wabash; 21, Hartford City; 22, Warsaw; 23, Greencastle; 24, Greensburg; and 25, La Porte.

Pre-war developments in milk distribution, L. F. Herrmann and W. C Welden (*U. S. Dept. Agr., Farm Credit Admin., Coop. Res. and Serv. Div., Misc Rpt. 62 (1942), pp. 24+*).—This is a "brief examination of some of the changes which took place in selected cities in recent years."

"A decade of change has seen increased sales of milk through stores in many markets, with a corresponding decline of sales in house-to-house delivery. In other markets, by contrast, the earlier balance between store and home delivery sales has persisted. . . . Important changes in container types have taken place. Single service fiber containers are used for packaging considerable volumes of milk in some markets. Multiple-quart glass containers are well established. Both of these container innovations were closely related to the expansion of store sales. Dealers using fiber containers have tended to use fiber exclusively. The multiple-quart glass container represents an addition to the line of standard glass bottle operations. Prospects for the future are clearly divided by the difference between war conditions and the probable conditions of the hoped-for peace."

Preliminary report of wartime transportation survey of trucks assembling milk and cream from Indiana producers, E. H. Matzen and V. C. Manhart (*Indiana Sta., Agr. Econ. Mimeog. No. 26 (1942), pp. 8+*).—This report presents facts obtained from questionnaires representing 339 milk trucks and 141 cream trucks. It discusses the trucks and their tires, routes and loads, and the draft classification of their operators.

Every-other-day delivery of milk, D. I. Kettelle and J. L. Tennant (*Rhode Island Sta. Misc. Pub. 15 (1942), pp. 9+, illus. 1*).—In a house-to-house survey of 302 families in Providence and 77 in South Kingstown to determine consumer reactions, only 3 percent expressed dissatisfaction with every-other-day delivery, but 11 percent were willing to accept it only as a necessary war measure. About 33 percent bought only from retail stores or used no fluid milk.

Paying producers for fat and solids-not-fat in milk, R. K. Froker and C. M. Hardin (*Wisconsin Sta. Res. Bul. 143, rev. (1942), pp. 48+, illus. 1*).—This revision (E. S. R., 87, p. 293) includes several changes in presentation and some additional data, but continues the general plan and the various price formulas.

"All methods of price determination which are developed in this report fit into one general payment plan for the entire industry. This plan has two parts: (1) A price per hundredweight of milk of a given test such as 3.5 percent fat, and (2) a price differential for each change of 0.1 percent fat and its accompanying 0.04 percent change in solids-not-fat. Adjustment in price for various tests of milk are made entirely through price differential."

Scouring samples of wool most equitable basis of price determination, A. C. Esplin (*Farm and Home Sci. [Utah Sta.], 4 (1943), No. 1, pp. 7, 14, illus. 1*).—Scouring tests at the station indicate that wide variations exist in the shrinkage of Utah's wool clips. "Sufficient evidence is now available to indicate that the scouring of a carefully selected composite sample gives a reasonably accurate determination of the yield of clean wool."

Farm petroleum delivery, W. T. Maakestad and F. Robotka (*Iowa Sta. Bul. P52 (1943), pp. 681–728, illus. 2*).—It is estimated that tank trucks serving Iowa farmers travel 24 million miles a year and that this mileage may be reduced from 30 to 40 percent without depriving farmers of essential delivery service. A survey of 64 school districts selected at random in 22 Iowa counties showed that 11.1 farmers in the average district purchased from 7.6 salesmen. Five plans to facilitate transportation conservation are outlined and discussed, these involving, respectively, the setting up of delivery districts, setting up a tank truck "dispatching" office in an area, the prescribing of minimum standards of efficiency for tank truck delivery operation, dealer collaboration, and the allocation of a trade area to a single bulk plant.

Economic theory of cooperation, I. V. Emelianoff (*Ann Arbor, Mich.: Edwards Bros., 1942, pp. 269+*).—The problem of cooperative type of economic organization is presented as a problem of economic morphology. The theoretical scheme outlined differs sharply from the "institutionalized" economic "philosophy of cooperation." It is an analysis of the patterns of cooperative organizations without special emphasis on the variants of these patterns.

Review of agricultural cooperation in Venezuela, M. Cardozo (*Washington, D. C.: Pan Amer. Union, 1942, pp. 18*).—A brief review of cooperation in Venezuela from 1936 to December 1942.

Foreign Agriculture, [February and March 1943] (*U. S. Dept. Agr., Off. Foreign Agr. Relat., Foreign Agr., 7 (1943), Nos. 2, pp. 27–48+; 3, pp. 51–72+*).—Included in No. 2 are articles on The Mexican Agricultural-Credit System, by J. L. Wooster (pp. 27–38), and on The United States-Mexican Trade Agreement, by K. H. Wylie (pp. 39–48). No. 3 contains articles on United States Lend-Lease Shipments and the British Food Situation (pp. 51–55); Contributions of the British Dominions to the United Nations Food Supply, by M. Ogdon and M. Wright (pp. 56–61); and British Agricultural-Production Policy, by M. Ogdon (pp. 62–71).

The agriculture of Cuba, P. G. Minneman (*U. S. Dept. Agr., Foreign Agr. Bul. 2 (1942), pp. 144, illus. 43*).—This bulletin discusses the natural resources, manufacturing and transportation, organization of agriculture, export crops, crops produced primarily for domestic consumption, livestock production, foreign trade, the degree of agricultural self-sufficiency, agricultural policy and government measures, and future agricultural development.

Public revenue in Ohio, with especial reference to rural taxation, J. D. Thewlis and J. I. Falconer (*Ohio Sta. Bul. 638 (1942), pp. 48, illus. 4*).—This is a revision of Bulletin 560 (E. S. R., 75, p. 272).

Collections of Federal internal revenue in Ohio were approximately 25, 286, 62, and 421 million dollars, respectively, in 1913, 1921, 1932, and 1941. Expenditures made in Ohio by the Federal Government were over 9, 146, 281, and 160 million dollars, respectively, in 1933, 1936, 1939, and 1941. Total revenue collections by the State and local governments of Ohio were over 400 percent greater in 1940 than in 1913. On a per capita basis, this was a 275 percent increase due to population growth during that period. In 1917, taxes and special assessments on property produced 82 percent of the total revenue of the State and local governments of Ohio, and no other single tax accounted for as much as 5 percent. In 1940, property taxes and special assessments produced 43 percent of the total, the gasoline and retail sales taxes produced more than 10 percent each, and liquor and beverage taxes and motor vehicle licenses each produced over 5 percent of the total revenue. From 1920 through 1930, when interest rates were relatively high, the total debt of all local units of government of Ohio more than quadrupled in amount. During the following decade, 1931 to 1940, a period generally of decreased revenues and cheap money, the debt was reduced approximately one-third. Exclusive of interest payments, public utilities, and debt retirement, expenditures by all units of government for educational purposes, charities and correctional services, and highways accounted for 32, 25, and 18 percent, respectively, of the total funds disbursed in 1940. No other single service required as much as 9 percent of the total. These three items have accounted for approximately 75 percent of the total annual expenditures since 1934, ranging from 31 to 33, 20 to 26, and 17 to 20 percent, respectively, each year.

Per capita property tax levies in rural and urban territory more than doubled during the 15 yr. prior to 1930, reaching $39.95 and $48.29, respectively, in 1927. As a result of reduced valuations and lower rates during the 1930's, the amount of taxes levied declined considerably. In 1940, the rural and urban levies were $17.14 and $29.64, respectively, with the latter reduced to $17.48 per capita if the levies for purely municipal purposes are removed from the total urban levy. Income declined much faster than property tax levies during the first half of the 1930–40 decade, a condition which caused an increase in property tax delinquency during that period. By 1940, the amount of delinquency had declined considerably, although it still was bad in some areas, especially certain urban districts. Excepting southeastern Ohio, delinquency was not a serious problem in rural areas at the time this bulletin was written. In 1935, taxes on farm property were at the 1914 level, while prices of farm products were 5 percent above the 1914 level. Since that time, the index of prices farmers receive has been more nearly in line with the index of farm property taxes, and the upward trend in the price index in 1941 continues through 1942.

Efficient use of farm taxes by Tennessee counties, B. H. Luebke and C. E. Allred (*Tennessee Sta., Econ. and Rural Sociol. Dept. Monog., 145 (1942), pp. 36+, illus. 10*).—"This report directs attention to the local use of funds raised within rural counties. So far as possible funds obtained from the State and Federal governments are separated out, as are also the functions largely directed by those outside agencies. The attempt is to focus attention on these financial aspects of county government for which the farmers of rural counties are primarily responsible." It discusses the cost of debt service, the cost of general administrative offices, the cost of law enforcement, and public aid and charitable expenses. Some methods are suggested for obtaining greater returns from county funds.

A study of county taxation and government: How local groups may improve conditions, L. P. Gabbard, E. D. Solberg, and H. C. Bradshaw. (Coop. U. S. D. A.). (*Texas Sta. Cir. 101 (1943), pp. 24, illus. 2*).—This tax survey of Young County indicated that intangible property largely escapes taxation, that there are gross inequalities in the assessment of real estate, and that tax delinquency aggravates these inequalities. Corrective measures are suggested. Schedules are appended for use in similar studies.

Index numbers of production, prices, and income, J. I. Falconer (*Ohio Sta. Bimo. Bul. 220 (1943), p. 42*).—Based on an index of 100 for the period 1910–1914, the prices paid by farmers reached a low of 108 in 1932 and 1933, and rose to 143 in December 1941 and 154 in October 1942. Cash income from sales, compared with 100 for the same base period, reached a low of 77 in 1932, but rose to 226 in December 1941 and 290 in October 1942.

Prices received by Alabama farmers for farm products, August 1909–August 1942, J. N. Mahan and J. F. Marsh. (Coop. U. S. D. A.). (*Alabama Sta. Bul. 258 (1943), pp. 72+, illus. 4*).—"The data are presented in the following order: (1) Average monthly prices and price relatives which show changes in prices of [26] individual commodities: (2) group indexes which show changes in prices of groups of similar products; (3) all-commodity indexes which show changes in prices of all commodities included in this bulletin; (4) annual summary comparisons, by commodity groups, all commodities, and United States prices received and paid by farmers; and (5) seasonal variations of prices, average 1932–41." The method used in constructing the price relatives and indexes is described.

A century of Indiana farm prices, 1841 to 1941, H. J. Houk (*Indiana Sta. Bul. 476 (1943), pp. 96, illus. 30*).—This statistical compilation supplements farm price data collected since 1910 by the U. S. Department of Agriculture by utilizing tabulations obtained from newspaper files for local farm commodity price quotations for 38 markets in as many counties. A composite index of monthly farm prices on the basis of 1935–39=100 is included, as well as considerable data as to farm price purchasing power and a historical analysis.

North Dakota farm prices, P. V. Hemphill (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 3, pp. 32–33*).—The usual tables of average prices of 14 major commodities and indexes of North Dakota agriculture are brought down through December 1942.

[The rise of retail food prices in Puerto Rico], S. L. Descartes (*Puerto Rico. Univ. Sta. Mimeog. Rpt. 20, Sups. 8–12 (1942), pp. [6] each.*)—Continuing these supplements in Spanish and English (E. S. R., 88, p. 696), the index number of the retail costs of all foods in Puerto Rico was found to rise from 174 on July 14, 1942, to 185 on August 18, 189 on September 15, and 198 (revised figure) on October 14. The index declined from 206 on November 16 to 203 on December 15, representing the first decline since November 1941.

Agricultural statistics, 1942 (*U. S. Dept. Agr., 1942, pp. 840+*).—This volume, which continues the series (E S. R., 86, p. 549) prepared by the Yearbook Statistical Committee, "brings together the more important series of statistics prepared by the Department of Agriculture or compiled by the staff for official use."

A graphic summary of farm crops (based largely on the Census of 1940) (*U. S. Dept. Agr., Misc. Pub. 512 (1943), pp. 104+, illus. 165*).—This publication, prepared by the Bureau of Agricultural Economics, supersedes Miscellaneous Publication 267 (E. S. R., 79, p. 408).

Crops and Markets, [January 1943] (*U. S. Dept. Agr., Crops and Markets, 20 (1943), No. 1, pp. 68, illus. 2*).—This is the usual report, but deals especially with the acreage and production of crops in 1942.

RURAL SOCIOLOGY

Rural population in New York State, 1940, W. A. Anderson (*[New York] Cornell Sta. Mimeog. Bul. 5 (1942), pp. 13+*).—Data drawn from the 1940 Census indicate that the rural population of New York State increased from 2,066,114 persons in 1930 to 2,313,249 persons in 1940. For the first time since 1880, there appears to be both a numerical and a percentage increase in the farm population during a decade, although the increase in the rural-farm population is all the more striking since the census reports a decrease between 1930 and 1940 in the number of farms in the State of 6,568 and a decrease in the amount of land in farms of 809,296 acres.

"The net increase in rural population between 1930 and 1940 is the result of the continuation of the movement of persons from the cities into rural territory as rural-nonfarm inhabitants, but also of their occupancy of some new farms in the territory suburban to New York City and the other large cities of the State, to be classified as farm inhabitants, together with an increase in farm residents resulting from the increasing practice of living on farms near urban sources of occupation and commuting to and fro. . . . The introduction into rural areas of such a significant number of nonfarming people and the use of the farm home as a place of residence for members who work in the urban centers, creates problems of accommodation and assimilation not previously encountered. . . . Such shifting of population will demand many new adjustments in almost every aspect of our living."

A partial list of publications on farm labor requirements by commodities, H. W. HAWTHORNE and R. MARX (*U. S. Dept. Agr., Bur. Agr. Econ., 1943, pp. 209+*).—This list contains references to Federal and State publications and, in a few instances, to unpublished data. These references give, on an acre or other unit basis, physical quantities of labor used in the production of farm commodities in one or more localities.

The Ohio farm labor situation, F. L. MORISON (*Ohio Sta. Bimo. Bul. 220 (1943), pp. 3-4*).—A study of the farm labor situation in Ohio made in October-November 1942 revealed approximately 8 percent less manpower in 1942 than in 1941 and also less experience. About 19 percent of the farms had workers to whom induction in the armed services appeared imminent. Changes in selective service regulations should help to decrease depletion of manpower on farms, but the movement to industry will continue unless means are taken to control it. Nevertheless, it was apparent that many small farms lacking in capital and farm equipment still had a surplus of farm labor, and how to utilize more fully the labor resources of such farms is one of the problems to be solved.

The farm labor situation on Wisconsin dairy farms. (Coop. Wis. Expt. Sta. et al.). (*U. S. Dept. Agr., Bur. Agr. Econ., 1942, pp. 25+*).—Records of farm labor situations and adjustments were obtained from 102 farms in Jefferson County and were supplemented by information developed in discussions with 3 groups of about 10 farmers each.

Family labor provided 88 percent of all labor used on Jefferson County farms in 1942. There was a little less labor hired (0.53 mo.) in 1942 than in 1941. Farm operators worked longer hours, wives spent more time at farm labor, and sons spent more time out of school to help in 1942.

Men of military age provided 20.4 percent of the total labor supply, 10.8 percent being labor of farmers' sons and 9.6 percent hired men. "Less than 100 farm workers have been drafted, while 645 have been deferred. Uncertainty of whether workers of military age will be available for work for longer than 3 mo. at a time is an important hazard to production planning. . . .

"Net farm income increased proportionately more in 1942 than the total farm wage bill even though farm wage rates increased more than farm prices. . . . Production of milk in Wisconsin for the 12 mo. ended October 1942 was 105 percent of the previous 12 mo."

Scarcity of labor the most serious problem confronting agriculture in attaining 1943 production goals, D. A. BROADBENT and W. P. THOMAS (*Farm and Home Sci. [Utah Sta.], 4 (1943), No. 1, pp. 1, 12, illus. 1*).—Tabular data showing the estimated monthly distribution of labor required to produce fruit crops, truck crops, feed crops, and livestock to meet the 1943 production goals are presented and discussed.

Organizing victory work: How farmers can help, J. M. TINLEY (*California Sta. Mimeog. Rpt. 82 (1943), pp. 20+*).—The purpose of this report is to indicate what individual farmers and farming communities can do to ease the farm labor situation during 1943. Major emphasis is placed on what can be done to insure better utilization of school children and adult city volunteers.

Farm families in the Grange: A study in Cortland and Otsego Counties, New York, W. A. ANDERSON (*[New York] Cornell Sta. Mimeog. Bul. 7 (1943), pp. 38+*).—Interviews of 788 farmer families in Cortland and 390 in Otsego Counties form the basis of this comparison of Grange and non-Grange members. In Cortland County 354 husbands and 271 wives were members and in Otsego County 85 husbands and 86 wives.

A considerably larger proportion of the Grange members also belonged to other organizations and participated actively in their work. Grange members were slightly older, more stable as to residence, had slightly more formal schooling, had more household conveniences and better communication facilities, and had higher family incomes. Little difference was noted as to family composition and size of families. In Cortland County 52 percent of the member families and 29 percent of the nonmember families lived on class IV land or better.

Can Iowa have better public library service, C. A. ANDERSON and N. C. GROSS (*Iowa Sta. Bul. P50 (1943), pp. 601-623, illus. 26*).—This bulletin shows that Iowa offers free library service to only half of its people, including almost none of its farm families.

AGRICULTURAL AND HOME ECONOMICS EDUCATION

Farm management in the South, R. L. HUNT (*Danville, Ill.: Interstate, 1942, pp. 566, illus. 189*).—This book deals specifically with the South and has been written primarily for the use of pupils enrolled in vocational agriculture classes. Its 23 chapters deal with the following topics: Farming as a vocation, some characteristics of present day farming, some characteristics of southern agriculture, determining the choice of farm enterprises, differences in the efficiency of the factors of production, combining the factors of production, selecting farm power and equipment, selecting a farm, measuring the success of a farm, specialized and diversified farming, size of farms, the farm budget, estimating livestock production under range conditions, need for livestock in the farm program, budgeting livestock enterprises, keeping farm records, the farm layout, financing the farm, economic information as a guide to farm adjustments, cooperation as a means of increasing farm profits, conservation and farm management, farm rental contracts, and planning for home construction.

Fundamentals of economic geography, N. A. BENGTSON and W. VAN ROYEN (*New York: Prentice-Hall, Inc., 1942, rev. ed., pp. 802+, illus. 300*).—This text is designed to furnish the subject matter for an introductory course in college geography. Originally issued in 1935, the statistical material has been brought up to date, new graphic illustrations have been provided to show the latest prewar trends of production, and new maps on larger scales are included. Many sections of the text have been rewritten to emphasize recent developments relating to the problems confronting the United Nations at war.

FOODS—HUMAN NUTRITION

The nutrition handbook: A complete guide to the nutritional content of the food we eat, D. TAYLOR (*Garden City, N. Y.: Doubleday, Doran and Co., 1942, pp. 231+*).—This book, written in simple form for the nonscientific reader, presents the fundamentals of sound nutrition and offers practical help in the application of these principles to dietary practice and meal planning. Authentic information is given concerning the essential nutrients, what they are, what role they play in the body, in what foods and in what quantities they occur, and in what amounts they are needed daily by individuals of different ages and activity. Examples are given to show how to calculate the dietary value of the day's meals; practical suggestions are given concerning meals for children, meal planning and marketing, menu making, and cooking to conserve vitamins and minerals; the question of acidosis is discussed and the bogeyman thereof dispelled; and food fads and fallacies are considered briefly.

Tables of food values, A. V. Bradley (*Peoria, Ill.: Manual Arts Press, 1942, rev. and enl., pp. 224*).—These tables show the food value of average servings or of convenient measures of commonly used foods, including not only fresh or uncooked foods but also canned products and foods cooked or otherwise prepared. Recipes on which the food value calculations are based are presented in many cases. Values are given for protein, fat, and carbohydrate in grams, energy in calories, minerals in shares and grams, vitamins in International Units and milligrams, and reaction in cubic centimeters of excess acid or base, per serving or measure and per 100-gm. portions, of the various foods classified in the following groups: Beverages, breads, cakes, cereals, cheese, cookies, crackers, eggs, fats, fish, flour, fruits, ices and ice cream, meats, meat substitutes and extenders, milk, miscellaneous, nuts, pies, puddings, salads, salad dressings, sandwiches, sauces, soups, sweets, and vegetables. Supplementary tables indicate the weight, measure, content of alcohol, carbohydrate, and protein, and the energy value of various alcoholic beverages and mixed drinks. Recipes for the latter are given. Preliminary chapters discuss the components of the diet and diet calculation and meal planning. A glossary of nutrition terms and a bibliography are appended.

Cured lamb for variety in Oklahoma farm meals, J. A. Beall and D. I. Purdy. (*Oklahoma Sta. Bul. 264 (1943), pp. 6, illus. 1*).—Lamb cured by a method recently developed and involving chilling, brining, and light smoking is recommended for use in varying the farm family menu. Recipes for utilization of the cured lamb are given.

The nutritional value of soy flour, F. Hafner (*Bakers Digest, 16 (1942), No. 11, pp. 247-248, 251*).—Data are assembled and discussed briefly to show the relative nutritive value of soy flour (enzyme-inactive extracted type from dehulled yellow beans) and wheat flour with respect to protein, minerals, vitamins, carbohydrates, and fat.

Edible fats and oils: Two chemical characteristics, G. E. Vail and R. Hilton. (Kans. State Col.). (*Jour. Home Econ., 35 (1943), No. 1, pp. 43-46*).—Smoking points, determined visually by observing the temperature at which a continuous thin, bluish smoke was visible against a dark background as the fat was heated in a 4½-in. silica evaporating dish, were found to range from a high of 245° C. to a low of 190° for the 17 vegetable fats and oils examined and from 234° to 174° for the 8 animal fats. Two combined vegetable and animal fats smoked at 209° and 170°. There was an average drop of 2.2° in the decomposition points when the fats were heated in a 6-in. frying pan. Determination of the smoking point by use of the fuchsin bisulfite test to detect acrolein given off by the heated fat resulted in still lower smoking points, averaging 24.6° lower than those obtained by the visual method. The percentages of free fatty acids before and after heating for periods of 2, 6, 12, and 20 hr. showed a wide range. There was no apparent relationship between the smoking point of the fat, or the original fatty acid content of the fat, and the increase in fatty acids with the heating. However, the percentage of free fatty acids, as oleic, in the fats tended to be inversely proportional to the smoking point.

Why produce your own food? R. C. Freeman and I. Crouch (*Illinois Sta. Cir. 545 (1942), pp. [8], illus. 1*).—Household account records for 1941 of 247 farm families in the State who had kept account of foods produced, bought, and consumed during the year are used to illustrate the more varied and abundant diet and greater financial savings to the families producing a large share of their food supplies, as well as the contribution these families made to the national war effort through increasing total food stocks, lessening the load on commercial transportation and industrial facilities, and reducing the use of family tires and gasoline.

Home utilization of muscadine grapes, C. DEARING (*U. S. Dept. Agr., Farmers' Bul. 1454, rev. (1942), pp. 26+, illus. 6*).—This revision (E. S. R., 54, p. 87) gives directions and recipes for the utilization of muscadine grapes in the preparation of sirups, juice, jelly, conserves, pastes, and other products.

Canned food manual (*New York: Amer. Can Co., [1942], pp. 104, illus. 74*).—This manual, prepared for the United States Army, presents general information concerning the way foods are canned and how long they will keep; gives a statement as to their nutritive value in comparison with fresh foods; answers common questions about canned foods; and tells in general how they should be used and stored. A second section is devoted to food serving charts, giving the average number of servings per can, the number of cans required per 100 servings, and the cost per serving. The third section gives a word about tin cans, and the fourth section gives information on the preparation and canning, nutritive value, and use in the diet of 34 canned foods.

The freezing preservation of foods, D. K. TRESSLER and C. F. EVERS (*New York: Avi Pub. Co., 1943, pp. 763+, illus. 161*).—This book brings up to date the material presented in the earlier treatise on freezing preservation of fruits and vegetables (E. S. R., 76, p. 297) and extends the scope of the work to cover the freezing of meat, poultry, fish, shellfish, and dairy products. The interests of farmers and others who freeze food for their own uses are considered, as well as the interests of those engaged in freezing foods on a commercial scale. The various chapters are devoted to discussion of the principles of refrigeration; cold storage, sharp freezers, and sharp freezing; quick freezing and the quick freezing systems; frozen food locker plants; freezing cabinets and farm freezers; changes occurring during the preparation, freezing, cold storage, and thawing of foods; packaging materials and problems; adaptability of fruits to freezing; the preparation for freezing and freezing preservation of fruits; the manufacture and freezing of fruit juices; adaptability of vegetables and vegetable varieties to freezing; the preparation and freezing of vegetables, meat, poultry, fish, shellfish, and dairy products; the storage, transportation, and marketing of frozen foods; the nutritive value of frozen foods; the cooking and serving of frozen foods; and the importance of quality control and standards in the frozen foods industries. The U. S. Department of Agriculture standards for grades of frozen vegetables and many chemical, physical, and bacteriological methods of examining frozen foods for quality are presented in the appendix.

Quality in frozen fruits and vegetables, J. D. WINTER (*Minnesota Sta. Bul. 362 (1942), pp. 24, illus. 5*).—The investigations summarized deal with the problems of freezing fruits and vegetables under conditions suitable to locker storage practices. For the most part the vegetables used were grown under the supervision of the division of horticulture, and the fruits were secured from the fruit breeding farm and from local commercial growers, all varieties being carefully checked. An effort was made to select all products at the proper stage of maturity for freezing. The usual procedures of preparation and packing were followed except as varied for experimental purposes. The frozen products were prepared for the table under standard conditions and judged by a small committee of experienced judges.

The findings are discussed in sections dealing with the relations between variety and quality, in which the fruit and vegetable varieties tested during the period 1936–42 are classified by year as good to very good, fair to good, and poor to fair; the relation of storage temperature to quality, in which ratings are given for products packed in different ways and stored in lockers at three different temperatures; the effect of different packing and freezing methods; the effect of scalding procedures on quality, including a discussion of the inactivation of enzymes; sweetening materials, including corn sirup as partial replacement for sucrose, with a preliminary report on honey as replacement for sucrose; and temporary storage of frozen products.

Following this report of the research findings, general recommendations and practical suggestions are given for the freezing of fruits and vegetables, with tables for the amounts of sugar and other sweetening materials needed for specific fruits and scalding time required for specific vegetables.

Dehydrated foods for the Army, P. E. Howe and F. A. Cajori (*Jour. Home Econ., 35 (1943), No. 1, pp. 8–14*).—Dehydrated foods, used at present by the Army chiefly in overseas rations and rations packaged for special uses and to a limited extent in field rations in continental United States, are compared with fresh foods in regard to the contribution in nutrients that would be made to a typical Army ration. The low or negligible ascorbic acid content of dehydrated fruits and vegetables and the possibility of the decrease of carotene values, especially upon storage, are factors which must be compensated for in the use of dehydrated foods in a ration

The effect of storage of corn on the chemical properties of its proteins and on its growth-promoting value, D. B. Jones, J. P. Divine, and C. E F. Gersdorff. (U. S D. A.). (*Cereal Chem., 19 (1942), No. 6, pp. 819–830, illus 1*).—Mature Yellow Dent corn grown on the U. S. D. A. Arlington Experiment Farm, Va., was dried immediately after harvesting and used at once in experiments to determine the effects of storage over a period of 2 yr. on the proteins of whole shelled corn and whole corn meal ground from it. Certain samples of the whole grain and of the meal were stored in airtight containers and in closely woven cotton bags in dark cupboards at 76° F. and 55 percent relative humidity, while others were stored in a refrigerator room at 30°. Three types of changes were found to occur in storage, namely, (1) a decrease in solubility of the proteins in 3 percent NaCl, 70 percent alcohol, and 3 percent sodium salicylate; (2) a partial break-down of the proteins indicated by a decrease in true protein content, as measured by the copper hydroxide method of Stutzer; and (3) a decrease in digestibility by pepsin and trypsin. Samples stored at 76° were affected more than those at 30° and those in bags more than the ones in sealed glass jars. Changes in the ground corn were greater than those in the whole shelled corn. Total nitrogen and free ammonia remained unchanged, thus confirming observations by visible inspection that there was no spoilage or gross deterioration of the samples. At the end of 2 years' storage in a bag at 76°, the solubility of the ground corn protein in NaCl solution and in alcohol was about 60 percent less than that of the fresh material, indicating extensive denaturation of the proteins The true protein value and digestibility had decreased 32 and 29 percent, respectively. These changes occurred most rapidly during the early periods of storage. It is pointed out that these effects were very similar in type and extent to those previously described for wheat (E. S. R., 87, p. 139).

Feeding experiments in which rats received a diet containing sufficient corn to supply corn protein at a 10 percent level indicated, by the relative weight gains of the animals, that storage caused a decrease in the feeding value of the ground corn. Most of the decrease in growth-promoting value occurred in the first 6 to 12 mo. of storage.

The effect of temperature upon the viability and baking properties of dry and moist yeast stored for varied periods, E. J. Thiessen. (Wyo. Expt. Sta.). (*Cereal Chem., 19 (1942), No. 6, pp. 773–784, illus. 4*).—The activity of the yeasts before and after storage was measured by bread-baking tests and by measurement, utilizing the Sandstedt-Blish pressuremeter, of the gas produced in a dough of a given formula. The pressuremeter method proved a speedy and excellent way to test the viability of the yeasts. Quick-action dry yeast and also dry yeast cakes were active for periods of 12 mo. or longer when stored in the refrigerator at from 40° to 50° F. At a storage temperature of from 70° to 85° loss of activity was much more rapid. The quick-action yeast, for example, lost 37 percent of its activity in 7 mo. at from 70° to 80° as compared with 35.8 percent loss in 12 mo. at the lower temperature. Dry yeast cakes lost 66.5 percent of their activity in 6 and 32 mo., respectively, when held at the higher and lower storage temperatures. Moist compressed yeast held in the frozen state lost practically none of its activity in 1 mo. and surprisingly little in 3 or 4 mo., and even after a 12-mo. period of frozen storage, bread of fair quality could still be made from it. In the bread-baking tests the time required for fermentation and pan proofing of the dough increased with the length of the yeast storage period in order for the bread to attain the same degree of lightness as it had when fresh yeast was used.

The viability of the moist yeast was further tested by staining with methylene blue, which stains dead and injured but not living cells. A phosphate buffer was added to prevent an increase in the number of stained cells during the counting. A comparatively small percentage of dead cells was found in moist yeast frozen from 1 to 3 mo., but the percentage increased with longer storage. A loss of from 10 to 14 percent of the cells did not slow up dough fermentation to such an extent that the yeast was unsuitable for bread. There is an appendix by L. Anderson on buffer and stain for yeast cell counts.

A study of the diets of home demonstration club members' families in twenty-seven parishes of Louisiana, B. E. Bryson, C. Tucker, and H. J. Davis (*Louisiana Sta. Bul. 356 (1942), pp 23, illus. 2*).—Data for this study in 780 families were secured from questionnaires distributed to club members through the cooperation of E. LeNoir and the home demonstration agents of each parish, and were evaluated by the use of a score card patterned after the national nutrition "yardstick," classifying all protective foods as good, fair, or poor, depending upon the number of servings during a 1-week period. The adequacy of the quantity of fruits and vegetables canned at home was determined by a score card based upon the food preservation budget recommended by the State agricultural extension service. The parishes participating in the study comprised all of the seven agricultural areas of the State except the New Orleans truck and vegetable area and the central Louisiana farming area.

Taken as a whole, 41 percent of the diets scored good, 51 percent fair, and 8 percent poor. Families living in the rice area had somewhat the highest percentage of good diets, followed by the northeast Louisiana delta and Red River delta area; the upland cotton, bluff, and cut-over land area; the strawberry area; and the sugarcane area. Of the 10 protective foods or food groups, lean meat and meat substitutes scored good more frequently than any other group, followed in decreasing order by eggs; milk; green, leafy, and yellow vegetables; other cooked vegetables; other fruits and certain raw vegetables; citrus fruits and tomatoes; butter; potatoes; and whole-grain cereals. Servings of nonprotective foods increased rather than decreased with increased adequacy of the diets in protective foods. Vegetables were canned in more adequate amounts than fruits, and in most areas home canning increased the adequacy of the diets.

increases in the number of milk cows, hens, and brood sows were also reflected in increased adequacy of the diets.

In general the adequacy of the diets increased with the cash income. More than one-fourth of the families had annual cash incomes of $299 or less, slightly less than one-fourth incomes between $300–$499, and about 9 percent incomes between $500–$749. In these three groups the percentages of diets rated as good were 30, 36, and 33, respectively. For the four higher income classes the good ratings were 59, 61, 63, and 63 percent, but each included less than one-twelfth of the families. The diets of owner families were more adequate than those of tenant families.

Food for young children in group care, M. E. Lowenberg (*U. S. Dept. Labor, Children's Bur. Pub. 285* (*1942*), *pp. 34+*).—This bulletin has been prepared, as a contribution to the National Nutrition Program, to aid persons responsible for the feeding of children from 2 to 5 yr. of age in day nurseries, nursing schools, and day-care centers for children of working mothers. Following brief suggestions for fostering good eating habits in children, foods which should be included in a good daily diet are tabulated, and directions are given for buying, storing, and preparing the foods; suitable seasonal dinner menus are outlined, with sample menus for other meals; and finally suggestions are given for serving the meals and for the best use of community resources of workers and food. References are appended to books and free or inexpensive reference material, the latter including publications on school lunches suitable for the group feeding of older children.

Symposium on protein metabolism (*Fed. Proc.* [*Fed. Amer. Socs. Expt. Biol.*], *1* (*1942*), *No. 3, pp. 269–292, illus. 5*).—The following topics were reviewed, with numerous references to the literature: The Amino Acid Requirements and Protein Metabolism of the Avian Organism, by H. J. Almquist (pp. 269–273) (Univ. Calif.); Transamination, by P. P. Cohen (pp. 273–280) (Univ. Wis.); The Metabolism of the *d*-Amino Acids, by C. P. Berg (pp. 281–287); and The Relation of Vitamin C to the Metabolism of the Aromatic Amino Acids, by R. R. Sealock (pp. 287–292).

A salt mixture for use with basal diets either low or high in phosphorus, J. H. Jones and C. Foster (*Jour. Nutr.*, *24* (*1942*), *No. 3, pp. 245–256*).—A complete salt mixture suitable for use with synthetic diets, including those containing neither yeast nor casein nor other phosphoprotein, is described. This mixture, designated as salt mixture 12, was compared with salt mixture 351 of Hubbell, Mendel, and Wakeman (E. S. R., 78, p. 887) with regard to the effect on growth, calcification, and concentrations of Ca and P in blood serum, when used at levels of 2, 3, and 4 gm. per 100 gm. in basal diets either high or low in P. With a low-P basal diet, the new salt mixture was definitely superior to salt mixture 351 for both calcification and growth at all levels fed. With a high-P basal diet and the salt mixture at the 2-gm. level, salt mixture 351 was slightly the better of the two, but at the 3- and 4-gm. levels there was no detectable difference. At either the 3- or the 4-gm. level and with liberal amounts of vitamin D, the new salt mixture gave satisfactory results with either a high- or a low-P diet, although in the latter case the 3-gm. level was a borderline amount. The feeding of 4 gm. of the mixture per 100 gm. of basal diet is recommended, since results were very satisfactory regardless of the amount of P in the basal diet. The new salt mixture was constructed to furnish in an easily prepared mixture all the inorganic elements known to be indispensable to mammals in about the relative amounts demanded, using a minimum number of salts (inorganic), with the base-forming elements only slightly in excess of the acid-forming elements. Finally, the exact amount of each salt chosen was expressed in moles or a fraction of a mole to facilitate equimolecular substitution when desired. As made up, the mixture is composed of NaCl (5 moles), 292.5 gm.; KH_2PO_4 (6), 816.6; $MgSO_4$ (1), 120.3; $CaCO_3$ (8), 800.8; $FeSO_4.7H_2O$ (0.2), 56.6; KI (0.01), 1.66; $MnSO_4.2H_2O$ (0.05), 9.35; $ZnCl_2$ (0.004), 0.5452; $CuSO_4.5H_2O$ (0.004), 0.9988; and $CoCl_2.6H_2O$ (0.0002 mole), 0.476 gm.

The influence of lactose and its hydrolysis products on the absorption of calcium, E. Roberts and A. A. Christman *(Jour. Biol. Chem., 145 (1942), No. 1, pp. 267–271)*.—The method described for the study of the rate of absorption of Ca from the gut of the rat involved analyses of the total tract (and contents) excised from an intact animal to determine the residual Ca at a given interval following the administration of a definite quantity of Ca by stomach catheter. The value thus determined was corrected for the blank value obtained with rats on a Ca-low diet and receiving no Ca feeding. By this method a study was made of rate of absorption of Ca administered as calcium lactate contained in water or in solutions of lactose, galactose, or glucose. In general the rate of absorption of Ca increased progressively with the concentration of the administered calcium lactate. The presence of lactose or its hydrolysis products, glucose and galactose, at about 5 percent concentration did not increase the rate of Ca absorption. Higher concentration of lactose, attained by the use of a 20-percent solution or by preliminary feeding of a basal diet in which 20 percent of the starch was replaced by lactose, inhibited Ca absorption.

The sulfur metabolism of children, E. F. Beach, D. M. Teague, O D Hoffman, B. Munks, F. C. Hummel, H. H Williams, and I. G. Macy *(Jour. Nutr. 24 (1942), No. 3, pp. 257–271, illus. 4)*.—Sulfur retention and excretion and urinary S partition were determined in relation to N retention and excretion in eight normal, healthy children from 8 to 12 yr. old over a 45-day metabolic balance period. The diet, made up of 22 common foods and adequate in all nutritive essentials, was given daily in constant quantity for each child at a caloric level suitable for normal growth. Data showing for each child the average daily N and S balances and urinary S partition are presented. The diet furnished a daily intake of 0.973±0.043 gm. S and 13.09±0.39 gm. N for the younger children and 0.999±0.037 gm. S and 13.27±0.48 gm. N for the older children. Most of the dietary S and N lost from the body appeared in the urine, the urinary S and N losses averaging, respectively, 77.0 and 82.8 percent of the intakes. Inorganic S composed on an average 84 percent of the urinary excretion of that element. Ethereal sulfate excretion, representing conjugated compounds of indole, skatole, and phenol with sulfuric acid, excreted as the K salts, averaged 48 mg. daily. It was observed in these children that with increasing age there was a decreasing laxation rate, accompanied by increasing urinary ethereal S. Neutral S, the fraction of total urinary S not accounted for as either inorganic or ethereal sulfate S, averaged 70 mg. daily. Under the conditions of the experiment only remote relationships were found between neutral S output and age, body weight, and surface area, but there was a relation between neutral S and recumbent body length. The average N: S ratios for intake, feces, and urine were 13.4, 10.5, and 14.4, respectively, while the N: S ratio of the retentions averaged 8.8; however, if S losses through the skin are assumed to be comparable with values reported in the literature for such losses, then the average of the N: S ratio of the true retentions would be near 15, a ratio which has been indicated for the entire body by analyses of muscle tissue.

Potassium, sodium, and chlorine balances of pre-school children receiving medium and high protein diets, J. E. Hawks, M. M. Bray, S. Hartt, M. B. Whittemore, and M. Dye. (Mich. Expt. Sta.). *(Jour. Nutr., 24 (1942), No. 5, pp. 437–448)*.—The balance data presented and discussed in this paper were obtained as part of a previously noted study (E. S. R., 88, p. 550) of the effect on the metabolism of preschool children of increasing the protein content of the diet from a level of 3 gm. of protein per kilogram of body weight to a level of 4 gm. Average apparent retentions of potassium per child per day ranged from 6 to 12 mg. at the 3-percent protein level and from 10 to 14 mg. at the 4-percent protein level, these representing, respectively, from 3.2 to 6.1 and from 5.0 to 6.8 percent of the average daily intake per child; corresponding figures for sodium were from 4.0 to 7.1 mg. (from 5.9 to 11.9 percent of intake) and from 5.8 to 8.8 mg. (from 8.1 to 14.6 percent of intake) at the 3- and 4-gm. protein levels, respectively; and for chlorine from 6 to 14 mg. (from 5.3 to 11.7 percent of intake) and from 12 to 23 mg. (from 10.7 to 16.8 percent of intake) at the 3- and 4-gm. levels, respectively. The 4-gm. protein diet produced little, if any, change in potassium retentions for some of the children but caused slight increases in others. However, the sodium retentions were slightly higher and the chlorine retentions were distinctly higher on the 4-gm. protein diet. On the basis of the sodium and potassium retentions at the two protein levels, it appeared that an increase in protein without an increase in minerals did not cause as much muscle production as an increase in both protein and minerals, and that potassium, since it is primarily found in muscle tissue, may be a limiting factor in muscle growth. The increased chlorine retentions on the higher protein diets suggested that specific types of tissue may have been produced at that time.

Vitamin values of foods in terms of common measures, E. M. Hewston and R. L. Marsh (*U. S. Dept. Agr., Misc. Pub. 505 (1942), pp. 29+*).—Vitamin values in 100-gm., 1-lb., and common-serving portions of various foods are reported, values being given where available for vitamin A, thiamin, ascorbic acid, riboflavin, and vitamin D. The data are based on compiled values previously noted in Circular 638 (E. S. R., 87, p. 891).

Comparative stability of vitamin A in cod-liver oil and in oleovitamin A and D, A. D. Holmes and M. G. Pigott (*Jour. Amer. Pharm. Assoc., Sci. Ed., 31 (1942), No. 12, pp. 521–523*).—Samples of oleovitamin A and D, prepared by dissolving the natural vitamin A and vitamin D in cottonseed, peanut, and corn oils according to the official specifications in U. S. P. XII and two samples of medicinal cod-liver oils, containing, respectively, 1,000 and 4,000 U. S. P. vitamin A units per gram, were exposed in the laboratory to early winter sunshine and skyshine for 11 days to compare the permanency of their vitamin A content. Vitamin A potencies of the samples, dissolved in specially purified isopropyl alcohol, were determined with the Hilger vitameter before and after exposure. The results of the tests showed that about 80 percent of the vitamin A content of the oleovitamin A and D was lost, regardless of whether cottonseed, peanut, or corn oil was used as a diluent, while the cod-liver oils lost only about 46 percent of their vitamin A potency. "Possibly cod-liver oil may contain some natural antioxidant, or its vitamin A content may be in a more stable form than that of the vitamin A concentrate incorporated in the vegetable oils used for preparing the oleovitamin oils employed in this study."

The vitamin A value of Roquefort type cheese, E. N. Todhunter, C. E. Roderuck, and N. S. Golding. (Wash. Expt. Sta.). (*Jour. Dairy Sci., 25 (1942), No. 12, pp. 1023–1026, illus. 1*).—Vitamin A was determined by bio-assay, using the single feeding method of Sherman and Todhunter, in the following cheeses: A Roquefort-type cheese ripened with mold growth at a temperature of 50° F. for the period from September 10 to October 29, a cheese from the same curd batch ripened without mold in vacuum-sealed cans at 50° for this same period, and a sample of the salted curd held in vacuum pack at 0° for this period. The vitamin A content was the same for all samples of cheese, approximately 25 International Units per gram. It appeared, therefore, that the organism used in the manufacture of this Roquefort cheese, namely, *Penicillium roqueforti*, Culture 33D, did not have the capacity to produce carotene or vitamin A during the process of growth in the cheese.

Carotene in vegetable wastes, E. G. KELLEY and M. E. WALL. (U. S. D. A.). (*Veg. Growers Assoc. Amer. Ann. Rpt., 1942, pp. 62–67*).—This address gives a brief report of the progress to date of work by the vegetable section of the Eastern Regional Research Laboratory on obtaining carotene from truck-crop wastes to meet the demand for another source of vitamin A.

The effect of the level of protein intake upon the urinary excretion of riboflavin and nicotinic acid in dogs and rats, H. P. SARETT, J. R. KLEIN, and W. A. PERLZWEIG (*Jour. Nutr., 24 (1942), No. 3, pp. 295–306, illus. 2*).—An increase in the protein content of the diet associated with a positive nitrogen balance was followed by a decrease in the urinary excretion of nicotinic acid by dogs and of riboflavin by both dogs and rats. A decrease in the protein content of the diet similarly produced an increase in the excretion of the vitamins. In test-dose experiments on dogs the percentages of the test doses of riboflavin, nicotinic acid, and pyridoxin excreted (in cases where a difference in response to the test dose was obtained) were highest on the low-protein diet. The response to thiamin was not affected by protein. The replacement of casein by glycine affected the excretion of riboflavin and nicotinic acid to the same extent but at a different rate. During starvation, representing a period of protein catabolism, the urinary excretion of riboflavin and nicotinic acid increased. These findings are thought to indicate that riboflavin, nicotinic acid, and pyridoxin are concerned with protein anabolism.

The non-specificity of thiamine in fat synthesis, F. W. QUACKENBUSH, H. STEENBOCK, and B. R. PLATZ. (Wis. Expt. Sta.). (*Jour. Biol. Chem., 145 (1942), No. 1, pp. 163–167*).—The body fat increases in rats were studied during a 3-week period in response to various supplements of the B vitamins after long periods of depletion on two low-fat diets, one of which was deficient chiefly in thiamin and the other ample in thiamin but deficient in the other essential factors of the B complex. The results with the animals deficient in thiamin alone were similar to those reported by McHenry and Gavin (E. S. R., 81, p. 877) as substantiating evidence for the theory that thiamin functions in the synthesis of fat in the body. However, thiamin did not prevent rapid losses of fat in rat on a diet deficient in the other B vitamins, and it was no more effective than these in increasing the total fat content of the rats. "The effectiveness of a supplement in restoring normal fat synthesis in deficient rats is apparently determined by the completeness with which it supplies essentials lacking in the body tissues as well as in the basal diet."

Nicotinic acid in foods, R. W. MCVICAR and G. H. BERRYMAN (*Jour. Nutr., 24 (1942), No. 3, pp. 235–243*).—Data from the literature are presented in tabular form, with indication of the method of determination employed (microbiological, biological, and chemical) and with citation of the source. Where several values for a given food were found, a reasonably accurate working average is supplied in the table, this value, based on analyses of native North American material, being admittedly subject to revision in the light of future findings. The foods are grouped in the following classes: Meats; eggs; milk and milk products; butter; other fats; grains and grain products; legumes; sugars and sirups; leafy, green or yellow vegetables; tomatoes; citrus fruits; potatoes; vegetables other than leafy, green or yellow; fruits other than citrus; dried fruits; beverages; and miscellaneous.

Conjugated pyridoxine in rice bran concentrates, J. V. Scudi (*Jour. Biol. Chem., 145 (1942), No. 2, pp. 637–639*).—Rice bran concentrates precipitated with basic lead acetate were acidified and allowed to percolate through a column of superfiltrol mixed with Decalso (1:9) from which the vitamin was subsequently eluted with 0.25 N NaOH. The eluate, both with and without hydrolysis, was analyzed for pyridoxin content by a method involving slight modifications of a colorimetric procedure previously developed (E. S. R., 87, p. 11). The results indicated that hydrolysis increased the free pyridoxin content of the samples. The values obtained upon hydrolysis of the eluates were in satisfactory agreement with the rat growth and yeast growth methods of assay. Apparently, therefore, only pyridoxin was measured by the colorimetric method. Since agreement between this and the biological methods was attained only after hydrolysis, it appeared further that rice bran contained not only free pyridoxin but also a water-soluble pyridoxin conjugate of low molecular weight, which was not precipitated by protein precipitants and which was adsorbed by acid clay and eluted much as pyridoxin is.

Ascorbic acid (vitamin C) content of some tomato varieties and species, G. B. Reynard and M. S. Kanapaux. (U. S. D. A.). (*Amer. Soc. Hort. Sci. Proc., 41 (1942), pp. 298–300*).—This preliminary report of work in progress in connection with the tomato breeding program at the U. S. Southeastern Regional Vegetable Breeding Laboratory summarizes the values obtained for the ascorbic acid in 116 lines of tomatoes. These were chosen as representative of the results on over 500 lines, including commercial varieties, foreign accessions, hybrids, and selected lines. Ascorbic acid was determined in the fresh fruits, generally eight samples (two from each of four randomized blocks) for each line, by a method developed by Morell (E. S. R., 87, p. 15). The data were reduced by analysis of variance. "No significant differences were found due to position in the field, and slight but nonsignificant differences were found due to differences in ripeness, greener fruits having less ascorbic acid. Small but nonsignificant differences were found in successive pickings over a period of a month. The greatest variability appeared due to the differences between lines." Two small-fruited species, *Lycopersicon peruvianum* and *L. pimpinellifolium*, averaged the highest of any types examined. The former, a nonedible, green-fruited species, gave values ranging from 48.2 to 77.9 mg. per 100 gm.; and the latter species, the Red Currant tomato, varied from 35.3 to 72.6 mg. The intermediate-sized lines, representing 50 P. I. Accessions and including the Cherry and Pear tomatoes, ranged from 10.2 to 50.5 mg. per 100 gm. The 30 commercial varieties had the lowest value of any group, varying by varieties from an average of 11.2 for Bonny Best to 21.6 mg. per 100 gm. for Summerset. Some preliminary data on ascorbic acid content of hybrids from low and high ascorbic acid parent plants showed the first generation to be intermediate in both size and ascorbic acid content. In the second generation the ascorbic acid showed a wide range, essentially between the limits of the parental lines.

HOME MANAGEMENT AND EQUIPMENT

The use of consumer credit by Missouri farm families, M. Spicer, L. A. Young, and S. Korando (*Missouri Sta. Res. Bul. 351 (1942), pp. 19*).—Data were gathered by personal interviews with 188 families in Ralls County (a general livestock farming area) in 1940 and for 154 families in Lawrence County (a dairy farming area) in 1941. The size, tenure, etc., of the farms, sources and amounts of gross income, and other similar items are described for each county. Analysis is made for each county of the general use of credit, the use of merchant credit—open accounts and installment credit—cash loans, and long-term credit. For each type of credit such items as purposes and sources of credit, amounts outstanding, costs, repayments, influence of tenure, effects of size of family and tenure, etc., are discussed. "Approximately 80 percent of the families in Ralls County and Lawrence County used some form of credit during the year studied. Slightly more than 40 percent of the families in each county had financed long-term loans during the year. Forty-eight percent of the families in Ralls County had used short-term cash loans; 58 percent in Lawrence County. Practically the same percent, 29 percent in Ralls County and 27 percent in Lawrence County, had used installment credit, whereas almost twice as many families had used open-account credit in Lawrence County as had used it in Ralls County; 59 percent in Lawrence County, 31 percent in Ralls County. Of the total accounts, more than two-thirds were short-term accounts; less than one-third were long-term loans. Intermediate loans were relatively insignificant, since only 3 percent of the accounts in each county were of that type." Sixty-six percent of the accounts in Ralls County and 58 percent of those in Lawrence County were for farm business purposes. Of the short-time accounts, the percentage used for family living or for family living-farm business was equal to those for production in Ralls County. In Lawrence County the percentage was greater.

REPORTS AND PROCEEDINGS

Report of the Secretary of Agriculture, 1942, C. R. WICKARD (*U. S. Dept. Agr., Sec. Agr. Rpt., 1942, pp. 220+*).—The agricultural situation is extensively discussed under such headings as war work on the farm front, the role of food in modern war, food dehydration, farm prices and incomes, farm needs for machinery and other supplies, farm labor supply, victory gardens, goals for 1943, and cooperation with Latin America. The work of the Department is briefly reviewed, and a section is included (pp. 179–182) entitled Findings of Experiment Stations.

Report of the Administrator of the Agricultural Conservation and Adjustment Administration, 1942, M. C. TOWNSEND (*U. S. Dept. Agr., Agr. Conserv. and Adjust. Admin. Rpt., 1942, pp. 132+*).—This includes the combined reports of the Agricultural Adjustment Agency, the Soil Conservation Service, the Federal Crop Insurance Corporation, and the Sugar Agency for the fiscal year ended June 30, 1942.

Report of the Chief of the Bureau of Entomology and Plant Quarantine, 1942, P. N. ANNAND (*U. S. Dept. Agr., Bur. Ent. and Plant Quar. Rpt., 1942, pp. 60*).—Brief progress notes are given under the following general headings: Fruit and nut insects, fruitfly, Mexican fruitfly, Japanese beetle, insects affecting forest and shade trees, gypsy and brown-tail moths, Dutch elm disease, white pine blister rust, cereal and forage insects, barberry eradication, truck crop and garden insects, cotton insects, pink bollworm, bee culture, insects affecting man and animals, foreign parasite introduction, control measures, and insecticides.

Report of progress [of Maine Station] for year ending June 30, 1942, [F. GRIFFEE ET AL.] (*Maine Sta. Bul. 411 (1942), pp. 251–412+, illus. 23*).—This includes, in addition to meteorological data, abstracts of papers published by the station in 1941–42, previously noted or noted on page 70 of this issue, and the following sections, also issued as separates: Sections A, Fruits Research (pp. 251–267); B, Canning and Garden Crops (pp. 269–280); C, Potatoes (pp. 281–343), noted on pages 24 and 81 of this issue; D, Dairying Research (pp. 345–356); E, Poultry Research (pp. 357–371); and F, Foods and Nutrition (pp. 373–383).

Forty-ninth Annual Report [of Minnesota Station], 1942, C. H. Bailey (*Minnesota Sta. Rpt. 1942, pp. 94*).—In addition to articles noted previously or referred to elsewhere in this issue, abstracts are given of the following: Price Fixing of Agricultural Products, by W. C. Waite (p. 24); Testing and Recommending Varieties of Field Crops in Minnesota, by F. R. Immer (p. 28); Minnesota Forest Insect and Disease Survey for 1941, by A. C. Hodson and C. M. Christensen (p. 36); Seasonal Variations in Thermoduric Organisms and Methods of Control, by H. Macy and J. A. Erekson (p. 44); Velvet Ants, by C. E. Mickel (p. 44); Boron Deficiency on Minnesota-Grown Celery, by R. C. Nelson (p. 45); Vegetables—Culture in the Garden—Part 22, Sage, *Salvia officinalis*, by L. Sando and A. E. Hutchins (p. 45); and A Method of Measuring the Satisfaction of Wants, by E. C. McVoy (p. 46).

Fifty-second Annual Report [of Washington Station], 1942, E. C. Johnson et al. (*Washington Sta. Bul. 425 (1942), pp. 121*).—This report summarizes by subject-matter divisions the results of each study carried on during the year. Brief abstracts are appended for the station publications and scientific papers.

[Abstracts of papers presented at the forty-fourth general meeting of the Society of American Bacteriologists and at meetings of the Kentucky, Virginia, and Washington (D. C.) branches] (*Jour. Bact., 45 (1943), No. 1, pp. 11–93*).—Of some 160 papers presented by various authors at these meetings, many are by State agricultural experiment station workers, and the fields covered include general bacteriology (physiology and biochemistry, technics, variation, bacteriologic studies on sulfonamides, antibiotic substances, and vitamins); agricultural and industrial bacteriology (including disinfectants, and sanitary, dairy, soil, and industrial bacteriology); medical and public health bacteriology, immunology, and comparative pathology; and problems in poliomyelitis.

MISCELLANEOUS

List of available publications of the United States Department of Agriculture, F. L. Zimmerman and P. R. Read (*U. S. Dept. Agr., Misc. Pub. 60, abr. (1943), pp. 26+*).—This is an abridged edition (E. S. R., 88, p. 142), listing only free publications of general interest to farmers and homemakers.

The story of the experiment station (*[New York State Sta.] Cir. 136, [rev.] (1942), pp. [18], illus. 52*).—This revision (E. S. R., 68, p. 138) is "an attempt to tell briefly something about the main lines of work under way in each of the eight research divisions."

Agriculture in the Americas, [March 1943] (*U. S. Dept. Agr., Off. Foreign Agr. Relat., Agr. in Amer., 3 (1943), No. 3, pp. 43–58+, illus. 17*).—In addition to several shorter articles, this issue contains papers on Argentina Loves Her Cattle, by C. C. Taylor (pp. 43–46); A Land Policy for the Americas, by A. Atkinson (pp. 47–49); Venezuela—Cradle of Americanism, by P. L. Green (pp. 52–54); and Trade Agreement With Mexico, by K. H. Wylie (pp. 55–56).

NOTES

Connecticut University and Storrs Station.—Franklin W. Southwick has been appointed assistant professor of pomology vice Dr. Wesley P. Judkins, resigned to return to the Ohio Station as assistant in horticulture, and will devote half time to research in pomology.

Florida University and Station.—Dr. Walter A. Leukel, associated with the institution since 1925 and agronomist since 1932, died April 27 at the age of 57 years. A native of Wisconsin, he received from the university in that State the B. S. A. degree in 1916 and the Ph. D. degree in 1925. He was widely known in Florida and elsewhere through his research on pasture grasses and farm crops.

Kansas College and Station.—The legislature has appropriated $2,653,000 for the support of the college and four branch stations during the biennium beginning July 1. In addition to lump sum appropriations for salaries and maintenance for instruction and research, the total includes $102,000 for the four branch stations, $52,000 for outlying experimental fields, $10,000 for bindweed experimental work, $30,000 for research work on diseases of livestock, $15,000 for milling and baking research, $20,000 for laboratory equipment, $200,000 for extension work, and $60,000 for a 16-week wartime summer session. This total also includes $64,500 for the completion of a military science building, $50,000 for a small animal laboratory building, and $12,500 for repairs on the power plant.

President F. D. Farrell retires July 1 to become president emeritus and will be succeeded by M. S. Eisenhower, Associate Director of the U. S. Office of War Information.

Pennsylvania Station.—A fruit and vegetable research laboratory was opened at North East on April 1. The work planned includes extension of studies on the control of the grape berry moth and leafhoppers to cover other fruit insect pests and to study horticultural and plant disease problems of the lake region. Dr. L. L. Huber, associate entomologist in the Ohio Station, has been appointed to institute a program of development of corn hybrids adapted to Pennsylvania conditions, in which he will test the usefulness of existing hybrids, breed new ones, and promote their use. Special attention will be given to insect and disease resistant strains.

Edwin J. Anderson, assistant professor of entomology extension, has been transferred to full-time work for the station on such beekeeping problems as winter care and the shipment of package bees.

West Virginia Station.—A total budget of $135,750 has been appropriated by the legislature for the work of the station during the 2-year period beginning July 1. This figure represents some reduction from the previous biennium in the allotments for salaries, general expenses, and equipment, but is supplemented by $7,500 for a new agronomy farm, necessitated through expansion of the local airport, $4,800 for the Reymann Memorial Farm at Wardensville, and $16,950 for the university experiment farm at Kearneysville.

Construction of a feeding barn ($8,000), a feed house ($20,000), and a cistern ($1,295) on the animal husbandry farm, a water system ($1,428) on the dairy farm to increase the capacity of the water supply, a cistern ($3,000) on the poultry farm, and improvements to the experimental animal laboratory ($584), along with paving of barnyards and runways of the dairy and animal husbandry farms and with improvements to the newly acquired home management house, is contemplated from a contingent fund of $64,768 allotted to the station from university funds.

Office of Experiment Stations.—Milton D. Moore, a member of the editorial staff of *Experiment Station Record* from 1911 to 1918, died March 10 at the age of 64 years. A native of South Carolina, he was graduated from George Washington University in 1913 and received the M. S. degree from the University of Wisconsin in 1917. Since 1922 he had been county agricultural agent in Washington County, Md.

Agricultural Science Instruction in Yale University.—Beginning July 1, the Sheffield Scientific School of the University is to offer a program of instruction in the agricultural sciences to provide fundamental training for men planning to enter any of the professional fields related to agriculture or the practice of agriculture itself. This program, it is announced, will "mark a new departure in agricultural education. Instead of combining practical with theoretical studies it will resemble premedical training in being limited chiefly to the basic sciences. It will be one of several elective programs in biology and will be parallel to the present courses of study in botany and zoology." It will include the sciences fundamental to agriculture, such as botany, zoology, chemistry, genetics, bacteriology, and entomology, but will not attempt to duplicate the training of practical agriculture given in agricultural colleges. The first year will parallel that of most university freshmen, with emphasis on mathematics and science. During the next 3 years the basic sciences will be taught, especially those most closely related to agriculture. In addition to its own staff of biologists, the school will call on experts from the Connecticut State Station and the University Schools of Forestry and Medicine to teach special subjects.

Soviet Government Award for Improved Potato Cultural Methods.—The Stalin First Prize of 200,000 rubles has been awarded by the Soviet Government to a group of scientific workers headed by Trofim Lysenko, president of the Lenin Academy of Agriculture, for his work in popularizing new methods in planting potatoes. A test suggested by President Lysenko of using as seed only the tops of potato tubers, thereby making available the remainder of the tuber as food, was made in 1942 by thousands of collective and State farms, with notable results. Other useful suggestions have dealt with the harvesting of cereals at an earlier stage of maturity and regulation of the rest period of various seeds and tubers.

New Journals.—*Boletín de la Asociación de Médicos Veterinarios del Perú* is being published at Lima. The initial number contains numerous short articles and abstracts and begins a paper by Dr. Marino E. Tabusso entitled The Ultravirus a Problem of Biology (pp. 7–19).

Sections E and F, dealing respectively with Forestry and Food Processing and Distribution, have been added to the *Bibliography of Agriculture* issued monthly by the U. S. D. A. Library (E. S. R., 87, p. 756). Section E continues *Forestry Current Literature*, which ceased publication in 1940.

Association of Land-Grant Colleges and Universities.—It is announced that the fifty-seventh annual convention of this association will be held in Chicago, October 27 and 28. Preconvention sessions, including a joint session of the Section on Agriculture, will be held on October 25 and 26.

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EXPERIMENT STATION RECORD

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RECENT WORK IN AGRICULTURAL SCIENCE[1]

AGRICULTURAL AND BIOLOGICAL CHEMISTRY

Azeotropism in the system nicotine-water: Separation of nicotine from related alkaloids by aqueous distillation, C. R. Smith. (U. S. D. A.). (*Indus. and Engin. Chem., 34 (1942), No. 2, pp. 251–252*).—The author studied the distillation of aqueous nicotine solutions from simple stills and from stills with fractionating columns of various types. He found that nicotine in a concentration of 2.5 gm. per 100 cc. under atmospheric pressure forms an azeotropic mixture which distills unchanged in any type of distillation. At this concentration nicotine lowers the boiling point of water slightly (about 0.012° C.). In proceeding from pure water there is a slight increase of total vapor pressure until a concentration of 2.5 gm. of nicotine per 100 cc. is reached, and then a decrease up to 6 gm. where it becomes constant. Judging from the results of distillation experiments, the author found that the vapor pressure-concentration curve deflects more sharply in passing from 6 to 2.5 percent than it inflects between 2.5 percent and pure water. That is, the minimum boiling point mixture is more readily reached in passing from 6 to 2.5 percent than from lower concentrations. Neither nornicotine nor anabasine forms such a mixture. A complete separation of nicotine can, therefore, be made from either of these two alkaloids, although they are slightly volatile with water vapor in simple stills. In the usual analytical procedure for determining nicotine, involving distillation from strongly alkaline solutions through apparatus with little fractionating effect, associated alkaloids, if present, may be completely removed with the nicotine in spite of their lesser volatility.

Nitromethane-isopropyl alcohol-water system: Vapor-liquid equilibria in the ternary system and in the three related binary systems, J. E. Schumacher and H. Hunt. (Purdue Univ.). (*Indus. and Engin. Chem., 34 (1942), No. 6, pp. 701–704, illus. 3*).—A means to recover nitromethane from the three-component mixtures is suggested.

Color reactions of 1,10-phenanthroline derivatives, M. L. Moss, M. G. Mellon, and G. F. Smith. (Purdue Univ. and Univ. Ill.). (*Indus. and Engin. Chem., analyt. Ed., 14 (1942), No. 12, pp. 931–933, illus. 2*).—A spectrophotometric study of the ferrous complexes of five derivatives of 1,10-phenanthroline indicates that these compounds may be used successfully as color-forming reagents for the determination of iron. Advantages over several methods in use, including sensitivity and freedom from pH effects, were observed. With the exception of the methyl derivative, they do not form complexes of exceptional stability and are not preferred over the parent compound. 1,10-Phenanthroline and its derivatives form insoluble, highly colored, cuprous complexes which can be measured colorimetrically in the presence of suitable solvents. These reagents are not satisfactory precipitants for copper. Molybdate ion in the presence of 1,10-phenanthroline, or its derivatives, may be reduced with chlorostannous acid to give a reddish hue capable of detecting 0.5 p. p. m. of molybdenum. The color is not sufficiently stable for quantitative purposes.

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[1] The publications abstracted in these columns are seldom available for distribution by the Office of Experiment Stations. In general, application should be made to the Office of Information of the U. S. Department of Agriculture, Washington, D. C., for publications of the Department; to the directors of the State agricultural experiment stations, as listed on page 3 of the cover of this issue, for publications of the several experiment stations; and to publishers of books and journals for material issued by them. Microfilms and photostatic copies, the latter legible without magnifying equipment, may be purchased from the Library, U. S. Department of Agriculture, Washington, D. C. Rates and other details are explained in a previous issue (E. S. R., 87, p. 324).

The compounds of which the metal ion complexes were studied included, in addition to 1,10-phenanthroline itself, 5-chloro-, 5-bromo-, 5-methyl-, a nitro-, and the 5-nitro-6-methyl- derivatives. These derivatives are tabulated, with their wavelengths of maximum absorption and their molecular extinction coefficients.

Lipid oxidase studies.—II, The specificity of the enzyme lipoxidase. III, The relation between carotene oxidation and the enzymic peroxidation of unsaturated fats, R. J. Sumner. (N. Y. State Expt. Sta.). (*Jour. Biol. Chem., 146 (1942), No. 1, pp. 211–213, 215–218, illus. 2*).—In the work recorded in the first of these two papers the relative effect of lipoxidase on various unsaturated compounds was investigated. The results indicate that the enzyme is most effective on the structural group

$$—CH{=}CH—CH_2—CH{=}CH—(CH_2)_7COOH$$

the double bond nearer the carboxyl group being probably of the cis configuration.

In paper III, evidence that carotene is not oxidized by the peroxides formed from unsaturated fat either directly or indirectly is submitted. The oxidation of carotene requires that the peroxidation of unsaturated fat be actually in progress. Since fat peroxidation is diminished by the coupled oxidation of carotene, it appears possible that the oxygen which reacts with carotene is derived from some intermediate produced during the peroxidation of the unsaturated fat.

Effect of metal ions on the reactions of phosphopyruvate by Escherichia coli, M. F. Utter and C. H. Werkman. (Iowa State Col.). (*Jour. Biol. Chem., 146 (1942), No. 2, pp. 289–300, illus. 2*).—In an extract prepared by grinding *E. coli* with powdered glass, Mg^{++} and Mn^{++} were shown to accelerate attainment of the phosphoglyceromutase-enolase equilibrium without changing the point of final equilibrium. K^+ and Na^+ had no effect and Ca^{++} and Ni^{++} were inhibitory. The only effect of Mg^{++} and Mn^{++} on the hexose diphosphate-triose phosphate equilibrium was an inhibitory action in high concentrations. Enolase was shown to be the enzyme actually stimulated by the metal ions. NaF completely removed Mg^{++} stimulation but had much less effect on Mn^{++} stimulation. Mg^{++} and Mn^{++} were shown to stimulate the transfer of PO_4 from phosphopyruvate to adenylic acid in the bacterial extract. NaF inhibited the stimulation of Mg^{++} but not that by Mn^{++}. Mg^{++} and Mn^{++} stimulated the break-down of adenosine triphosphate in the *E. coli* extract.

The rôle of potassium in muscle phosphorylations, P. D. Boyer, H. A. Lardy, and P. H. Phillips. (Wis. Expt. Sta.). (*Jour. Biol. Chem., 146 (1942), No. 2, pp. 673–682, illus. 1*).—The transfer of phosphate from 3-phosphoglycerate to creatine by homogenized fresh muscle tissue with creatine, adenylic acid, magnesium, and phosphate buffer additions could not be obtained unless boiled muscle juice preparations were added. Phosphorylation by minced tissue under these conditions was erratic and was greatly stimulated by addition of boiled muscle juice. It was found possible to replace the boiled muscle juice by potassium additions. The stimulating effect of potassium was irreplaceable by sodium. Under optimum conditions a high rate of phosphorylation of creatine with fresh extracts could be obtained. Potassium was found essential for the transfer of phosphate from either 3-phosphoglycerate or 2-phosphopyruvate to creatine, but not for the transfer from adenosine triphosphate to creatine. These results indicate indirectly that potassium acts in the phosphorylation of the adenylic system. The transfer of phosphate from 3-phosphoglycerate to creatine in the presence of added potassium was inhibited by relatively small concentrations of calcium. The optimum concentration of potassium for the phosphate transfer from 3-phosphoglycerate to creatine was 0.20 M, but lower concentrations allowed a marked phosphorylation to take place. High concentrations of potassium resulted in nearly complete inhibition of the transfer.

Advances in enzymology and related subjects of biochemistry, III, edited by F. F. NORD and G. H. WERKMAN (*New York: Interscience Pubs., 1943, vol. 3, pp. 408+, illus. 42*).—In this volume of the monograph series (E. S. R., 87, p. 192), the following contributions are included: Chromosomes and Nucleoproteins, by A. E. Mirsky (pp. 1–34); Effects of Temperature on Enzyme Kinetics, by I. W. Sizer (pp. 35–62); X-Rays and the Stoichiometry of the Proteins, by W. T. Astbury (pp. 63–108); The Chemistry of Glycogen, by K. H. Meyer (pp. 109–135); Verdoperoxidase, by K. Agner (pp. 137–148); Mechanisms of Carbohydrate Metabolism—An Essay on Comparative Biochemistry, by E. S. Guzman Barron (pp. 149–189); The Intermediary Stages in the Biological Oxidation of Carbohydrate, by H. A. Krebs (pp. 191–252); The Chemistry and Biochemistry of Pantothenic Acid, by R. J. Williams (pp. 253–287); The Chemistry and Biochemistry of Biotin, by K. Hofmann (pp. 289–313); Recent Progress in Tumor Enzymology, by J. P. Greenstein (pp. 315–348); and The Role of Microorganisms and Enzymes in Wine Making, by W. V. Cruess (pp. 349–386). Bibliographies terminate the individual sections. Author and subject indexes of this volume and a cumulative index of volumes I–III are included.

The nature of the proteins of cellular nuclei, D. T. MAYER and A. GULICK. (Univ. Mo.). (*Jour. Biol. Chem., 146 (1942), No. 2, pp. 433–440*).—The authors prepared a gland and effected separation of the nuclear material by freezing the tissue and drying it in vacuo while in the frozen state, grinding the dried material to a suitable fineness, then separating the nuclei from other cell constituents in an inert liquid of intermediate specific gravity. Nuclear material practically free from all other cell constituents was obtained. A new sulfur-containing fraction from the protein moiety of the nuclei of the thymus gland was isolated by two methods. This fraction was precipitable isoelectrically at pH 5.8–6.2 and was also soluble in 5 percent salt solution. When precipitated isoelectrically, the sulfur-containing fraction was associated with other materials of protein nature not rich in sulfur.

The preparation of asparagine, H. B. VICKERY, G. W. PUCHER, and C. G. DEUBER. (Conn. [New Haven] Expt. Sta.). (*Jour. Biol. Chem., 145 (1942), No. 1, pp. 45–53*).—Seedlings were grown in a closed cabinet provided with a drain for excess water and with an inlet for the mist of water droplets produced by a commercial air-humidifying device. A weighed quantity of seed was spread evenly on wire mesh trays, which had been given a coat of paraffin, to form a layer often two seeds thick, and the seeds were thoroughly sprayed with water from a hose with flat shower-bath spraying head at intervals of about 2 hr. for the first few days, and thereafter several times a day throughout the period of growth. During the night, the humidity was maintained at as near 100 percent as possible by so connecting the humidifying device to the cabinet that a continuous slow current of air carrying a mist of fine water particles was supplied. There should be as little exposure to light as possible. With soybeans, there seemed little advantage in prolonging culture beyond about 15 days, when the first leaflets begin to form, but, in white lupines, asparagine accumulation continues as long as the plants can be preserved in health in darkness (from 25 to 30 days), and may reach one-quarter or more of the dry weight of the seedling tissue. Directions for the extraction of the tissues and isolation of asparagine are given. It was found possible to obtain the asparagine in good yield by direct crystallization from the concentrated extract. Clarification with basic lead acetate is unnecessary. The final product may be purified to any desired degree by recrystallization from water.

On lysine and ornithine, H. D. Dakin (*Jour. Biol. Chem., 146 (1942), No. 1, pp. 237–240*).—It is shown that significant amounts of ornithine and lysine may be precipitated by silver nitrate and sodium hydroxide. The formation of phenylhydantoins from phenyl isocyanate derivatives of ornithine and lysine by the action of acid is shown to be accompanied by racemization, but racemization may be limited and optically homogeneous products having definite melting points obtained.

Solubilities and compositions of the phospho-12-tungstates of the diamino acids and of proline, glycine, and tryptophane, D. D. Van Slyke, A. Hiller, and R. T. Dillon (*Jour. Biol. Chem., 146 (1942), No. 1, pp. 137–157, illus. 3*).—The solubilities of the salts of 12-phosphotungstic acid formed by the diamino from the monoamino acids in protein hydrolyzates were established. amino acids glycine, proline, and tryptophan have been measured under varying conditions of temperature and mineral acid concentration, and conditions which appeared to approximate the optimal for the phosphotungstate separation of the diamino from the monoamino acids in protein hydrolyzates were established.

Histidine was found to form mixed phosphotungstates with arginine and lysine, so that when the molar sum of lysine and arginine exceeds the histidine, precipitation of the histidine is more complete than indicated by the solubility of its isolated phosphotungstate. The solubility effect of the arginine and lysine on the histidine was plotted as a function of the proportion of histidine in the mixture, so that solubility corrections can be made for histidine as well as for the other two diamino acids. Histidine did not show a reciprocal effect on the solubilities of lysine and arginine phosphotungstates.

Under the conditions used, the amino acid phosphotungstates precipitated, except that of cystine, approximate in composition the trivalent formula, 3 moles of monoamino acid, or 1.5 moles of a diamino acid, precipitating with 1 mole of $H_3PO_4.12WO_3$.

Observations on proteinase in brain, M. W. Kies and S. Schwimmer. (U. S. D. A.). (*Jour. Biol. Chem., 145 (1942), No. 2, pp. 685–691, illus. 2*).—Brain proteinase has been partially purified and shown to be of the catheptic type. Di- and tripeptidases were found in brain tissue. No evidence for the presence of a lipolytic enzyme similar to that found in muscle was obtained. The results indicated a large proportion of cathepsin in brain as compared with muscle. Brain, however, was found to autolyze neither more rapidly nor to a greater extent than did muscle under similar conditions. While the effect of the brain cathepsin undoubtedly contributes to the difficulty of handling brain tissue commercially, it does not seem to afford adequate explanation of the rapid disintegration of the material frequently observed in the packing industry.

Oxygen consumption during the histamine-histaminase reaction, M. Laskowski (Cornell Univ. and Univ. Minn.). (*Jour. Biol. Chem., 145 (1942), No. 2, pp. 457–461, illus. 3*).—When histamine is oxidized by histaminase, both the oxygen consumed and the rate of oxygen uptake depend upon the purity of the histaminase and vary greatly. The presence of hemin increases oxygen uptake. Other impurities may affect the uptake. The formation of H_2O_2 in the course of the histamine-histaminase reaction was not confirmed.

Cystine content of wheat and its quantitative determination, C. J. Gubler and J. E. Greaves. (Utah Expt. Sta.). (*Food Res., 7 (1942), No. 5, pp. 405–431*).—Because of an orange-red color present in hydrolyzed wheat samples and similar to that given by sodium β-naphthoquinone-4-sulfonate, the Sullivan method (E. S. R., 70, p. 444), though considered one of the two most promising for the authors' purposes, was abandoned in favor of the Folin and Looney method (E. S. R., 47, p. 504) in which the measured color is a blue. To correct for effects of extraneous reducing substances, cystine was removed by precipitation with mercuric chloride from a blank, of which the apparent cystine value was then subtracted from the total.

Seventeen varieties of wheat grown on the same soil and under the same conditions were found to contain an average of 0.364 percent of cystine. This corresponds to 0.097 percent of cystine-sulfur and represents 54.4 percent of the average total sulfur. A probable variation in cystine was found between varieties as well as between wheats grown under varying cultural conditions, and a positive correlation was found between cystine and sulfur as well as between cystine and nitrogen.

Viscosity changes in sodium salicylate disperision of hard red spring wheat gluten in relation to variety and environment, R. H. Harris, R. V. Olson, and J. Johnson, Jr. (N. Dak. Expt. Sta.). (*Cereal Chem., 19 (1942), No. 6, pp. 748–763, illus. 9*).—The rate at which gluten washed from hard red spring wheat flour disperses in 10 percent sodium salicylate solution was found related not only to wheat variety but also to the environmental conditions of soil and climate under which the wheat is grown. Glutens prepared from hard red spring wheats of high protein content tended to disperse more slowly than those from wheats of lower protein content. The differential quotient dv/dt (rate of change of viscosity with respect to time) appears to have the more significant value at the sixth hour of dispersion, owing to changes in the rates occurring at later periods of the dispersion process. In some instances the rate begins to fall off. The specific volume ϕ/C of the gluten micelles in sodium salicylate dispersion is not significantly correlated with wheat protein content or loaf volume in hard red spring wheat varieties.

The comparative baking qualities of hard red spring wheat starches and glutens as prepared by the gluten-starch blend baking method, R. H. Harris and L. D. Sibbitt. (N. Dak. Expt. Sta.). (*Cereal Chem., 19 (1942), No. 6, pp. 763–772, illus. 2*).—From the results of experimental bakings here reported, the authors conclude that doughs made from starch-gluten blends are higher in absorption than the original flour doughs. This is largely because of the lower moisture level of these flour constituents after drying, and that the absorption of doughs made from a variable starch with constant gluten was higher than that of doughs made with a variable gluten and constant starch. They observed also that the crumb-color score of the bread made from the original flours was higher than the blend-loaf score. Significant differences in loaf volume of the blends between varieties of wheat, as well as between locations of growth, were shown by the analysis of variance. It would follow that both the starches and glutens prepared from hard red spring wheats by the method used in this study vary in baking quality as a result of both inherited and environmental factors. These differences, as far as variety is concerned, indicate that certain wheats which have been viewed with suspicion in respect to baking strength have glutens which yield loaves of inferior volume as compared to glutens washed from wheats commonly considered to be of superior baking strength. Some of these superior wheats apparently have starches which produce loaves of relatively high quality when used in starch-gluten blends.

Protease activity and reducing matter content of wheat flour doughs in relation to baking behavior, T. Shen and W. F. Geddes. (Minn. Expt. Sta.). (*Cereal Chem., 19 (1942), No. 5, pp. 609–631, illus. 2*).—Baking tests on short patent, fancy clear, and low-grade hard red spring wheat flours made with additions of nil, 0.001, 0.002, 0.004, and 0.006 percent of potassium bromate at fermentation times of 1.5, 3.0, and 4.5 hr. showed the loaf-volume response and tolerance to bromate to be greatest for the fancy clear and low-grade flours. For each flour the bromate response decreased with extension of the fermentation time. Amino nitrogen and reducing-matter content of the doughs at mixing time increased with decreasing flour grade. When yeast fermentation was inhibited by octyl alcohol, proteolytic activity of the doughs, as measured by amino nitrogen from mixing to the end of the proof, increased with fermentation time and was only slightly depressed by bromate. Proteolytic activity increased with decreasing grade. In actively fermenting doughs amino nitrogen was utilized by the yeast, but bromate considerably depressed proteolytic activity, as indicated by the lower amino nitrogen levels at corresponding fermentation times. Reducing-matter content of nonfermenting doughs (octyl-alcohol-treated) increased more with time than that of fermenting doughs. Bromate had a marked depressing effect which was more pronounced the longer the fermentation.

Biochemical properties of "salt-rising" doughs, M. Milner and W. F. Geddes. (Minn. Expt. Sta.) (*Cereal Chem., 19 (1942), No. 6, pp. 723–748, illus. 9*).—Using a commercial preparation, known as Kohman's "salt-rising yeast" and prepared from milk cultures of spore-forming bacteria present in corn meal, the authors made a study of the optimum conditions for baking and the biochemical properties of the doughs.

Satisfactory loaves were obtained by using twice the quantity of ferment recommended, by adding all the water called for by the dough formula to the sponge, and maintaining the pH at levels above 5.8 by the use of dibasic sodium phosphate as a buffering agent. Salt-rising doughs markedly decreased in consistency with fermentation and were sensitive to overproof. Increased absorption and use of milk in the starter and sponge shortened the proof time required for optimum bread. Sucrose was without effect, while potassium bromate lengthened the proof time. Starters and sponges prepared without milk fermented slowly, and milk-free bread lacked the characteristic cheeselike odor and flavor of salt-rising bread.

Little or no sugar was utilized in the production of gas by the bacteria. The fermentation was characterized by a high rate of proteolysis, resulting in a marked slackening of the doughs during fermentation. Potassium bromate added at the sponge stage markedly decreased the rate of proteolysis as well as the rate of gas production and the development of acidity. The doughs prepared from bromated sponges exhibited the less slackening.

The farinograph failed to record the marked slackening of salt-rising doughs with fermentation and the stabilizing effect of potassium bromate. The extensograph clearly revealed the effects of fermentation and bromate, as well as the markedly greater extensibility of salt-rising as compared with yeast doughs.

Yeast fermentation and potassium bromate as factors influencing the harmful effects of wheat germ on baking quality, D. E. Smith and W. F. Geddes. (Minn. Expt. Sta.) (*Cereal Chem., 19 (1942), No. 6, pp. 785–804, illus. 4*).—The addition of wheat germ to the flour resulted in soft, sticky doughs and the production of loaves of small volume possessing "green" or underfermented characteristics. Dough-handling qualities and loaf characteristics improved as the fermentation time was extended from 1.5 to 4.5 hr. The inclusion of potassium bromate in the baking formula markedly improved dough handling properties and loaf characteristics. Allowing the germ to stand in aqueous suspension for periods up to 6 hr. prior to mixing with the flour had little or no improving action, but when potassium bromate was present in the aqueous suspension in relatively large concentrations (4 mg. per 5 gm of germ) some reduction in the harmful effects of germ on the baking characteristics of 5- and 10-percent germ-flour mixtures was noted. Prefermentation of the germ with yeast progressively decreased the harmful effects with time of prefermentation up to about 4.5 hr. with 5-percent germ-flour doughs. Longer prefermentation times gave little further improvement. The presence of potassium bromate in the fermenting germ suspension further improved the baking behavior of the germ-flour mixtures at short dough fermentation periods. Overeffects, resulting in the production of bread with "old" or overfermented characteristics, were obtained with long germ prefermentation periods and/or long dough fermentation periods, particularly when potassium bromate was added at the dough stage. Under optimum conditions, bread baked from 5- and 10-percent germ-flour mixtures approached the quality of that baked from the patent flour alone, with the exception of crumb color. Overtreatment of the germ resulted in bread possessing a brownish red crumb.

Changes in the barley kernel during malting: Chemical comparisons of germ and distal portions, A. D. Dickson and B. A. Burkhart. (U. S. D. A. and Univ. Wis.). (*Cereal Chem., 19 (1942), No. 2, pp. 251–262, illus. 6*).—The kernels of barleys and malts representing from 2 to 9 days' germination of these barleys were cut approximately into halves and were submitted to analysis, with particular emphasis on the enzymatic changes taking place during germination.

Total ash and nitrogen were reduced by steeping but did not vary appreciably during malting. Both were higher in the germ portion, the difference being greater for ash than for nitrogen. The greater part of the β-amylase production or activation was in the germ half of the kernel and remained there. α-amylase showed somewhat wider distribution throughout the kernel than the β-amylase. The proteolytic enzymes, measured by cold water and wort nitrogen, appeared to be distributed much more widely throughout the kernel than either of the amylases. From 70 to 80 percent of the total protein hydrolysis took place during malting in the germ half and only from 20 to 30 percent during mashing. Carbohydrate hydrolysis during malting was comparatively low in the germ end, attaining from 20 to 25 percent of the total.

The effect of temperature changes during malting on four barley varieties, H. L. Shands and A. D. and J. G. Dickson. (Wis. Expt. Sta. and U. S. D. A.). (*Cereal Chem., 19 (1942), No. 4, pp. 471–480, illus. 1*).—The results, in general, point to the possibility of improving malt quality by relatively simple temperature change during the malting period. They also indicate the desirability of further experiment to find responses to additional changes. Using different moisture levels out of steep in combination with different growth periods and different temperature schedules might permit production of more desirable quality and at the same time maintain efficient plant operation.

The effect of some inorganic plant nutrients on malt diastase activity, A. E. Braun. (Univ. Idaho). (*Jour. Biol. Chem., 145 (1942), No. 1, pp. 197–199, illus. 1*).—A commercial potato starch, purified by dialyzing in a collodion bag against distilled water for 5 days, was used for the substrate. A commercial malt diastase preparation was purified in the same manner. Manganese chloride increased diastase activity up to an ionic strength of 0.3 and zinc chloride up to 0.0003, while iron chloride, copper chloride, and boric acid did not increase diastase activity in any concentration employed.

Oxidation of raw starch granules by electrolysis in alkaline sodium chloride solution, F. F. Farley and R. M. Hixon. (Iowa Expt. Sta.). (*Indus. and Engin. Chem., 34 (1942), No. 6, pp. 677–681, illus. 4*).—In a study of the mechanism of the oxidation of starch paste by bromine in neutral solution, the authors secured confirmatory evidence for the oxidation of primary and secondary alcoholic groups, for the oxidative splitting of hexose units at a glycol grouping, and for the oxidation of aldehydic and ketonic groups to nonuronic acid units. In a second phase of the investigation, an electrolytic process for oxidizing raw starch granules by alkaline sodium hypochlorite was used to study the changes of raw starch during oxidation and to determine the effect of various factors upon the course of oxidation. The changes during oxidation were followed by determinations of hot viscosity, rigidity, gel strength, reducing power, turbidity, volume of swollen granules, quantitative birefringence, digestibility by β-amylase, and microscopic observation of swollen granules by photomicrographs. The course of oxidation was markedly affected by higher temperatures and increased alkalinity. An explanation of the action of alkaline hypochlorite on raw starch granules is presented.

Viscosity of starches, H. N. Barham, J. A. Wagoner, and G. N. Reed. (Kans. Expt. Sta.). (*Indus. and Engin. Chem., 34 (1942), No. 12, pp. 1490–1495, illus. 5*).—A modified rotating cylinder viscometer, suitable for viscosity measurements of starch pastes, consists principally of a rotating, doughnut-shaped solution cup and a free cylinder concentric with and suspended into the solution cup. Viscosity is measured by evaluating the restoring torque which must be applied to prevent the suspended cylinder from rotating. The instrument is provided with a micrometric device which measures the effective height of the liquid on the suspended cylinder. This, together with an instrument constant which is independent of the temperature, angular rotation, and properties of the liquid, makes possible the determination of the viscosity in absolute units. The viscometer permits continuous viscosity measurements of one poise or more to be made over a wide range of temperatures, or at a given temperature, at a constant velocity, and for an indefinite period of time. No turbulence was observed within the range of angular velocities employed.

Studies in esterification: Preparation and properties of starch propionate, D. E. Mack and R. N. Shreve. (Purdue Univ.). (*Indus. and Engin. Chem., 34 (1942), No. 3, pp. 304–309, illus. 5*).—Starch tripropionate can be made by refluxing, with vigorous agitation, starch, propionic acid, and propionic anhydride. There is some anhydride formation within the starch during the reaction. The acid esterifies about 8.7 times as fast as the anhydride. The rate equation $\theta={}_{K}\log\frac{C_2x+1}{1-x}$ can be used to follow the reaction, K being the rate constant, C_1 and C_2 functions of the starting concentration, x the fraction esterified, and θ the time.

The finished product is soluble in many organic solvents, insoluble in water, and can be used to give useful protective coatings on metal, wood, paper, cloth, etc., but the sheets of plasticized starch propionate prepared were too weak for practical use.

Waxy starch of maize and other cereals a possible competitor for tapioca, R. M. Hixon and G. F. Sprague. (Iowa Expt. Sta. and U. S. D. A.). (*Indus. and Engin. Chem., 34 (1942), No. 8, pp. 959–962, illus. 4*).—Starch from waxy corn has high viscosity, low gelling characteristics, and slight tendency to retrograde, which appear to fit this starch for utilization as a replacement for tapioca in many commercial products. Indicated uses are those of a remoistening glue, a paper size ingredient, and a minute-tapioca substitute. Starch was milled from waxy rice, waxy sorghum, and waxy barley. That from waxy barley differs from the others in having both red- and blue-staining granules.

Chemical examination of corn bran, F. E. Hooper. (Iowa Expt. Sta.). (*Indus. and Engin. Chem., 34 (1942), No. 6, pp. 728–729*).—A chemical examination of commercial corn bran and of hand-separated bran from the genetically pure strain of corn, Os 420, showed that both materials are low in lignins (4.9 and 2.6 percent, respectively) and relatively low in cellulose, and that they contain a high percentage of hemicellulosic material (73.2 and 77.1, respectively). The latter material appeared to consist of xylan (40.7 and 53.5 percent of the original tissue, respectively) and a less easily hydrolyzed polysaccharide.

Stabilizing zein dispersions against gelation, C. D. Evans and R. H. Manley. (U. S. D. A.). (*Indus. and Engin. Chem., 35 (1943), No. 2, pp. 230–232*).—It would be desirable for some industrial purposes to use zein concentrations as high as 40 percent, but this is usually impractical because of the rapid rate at which such dispersions gel at room temperatures. It has been found that zein dispersions may be stabilized against gelation to a limited extent simply by heating for 15 min. or longer at a temperature above 100° C. and below the point where destruction of the protein occurs; that their stability may be further improved by heating the dispersion, followed by adding from 1 to 5 percent of an aldehyde; and that much more stable dispersions may be prepared by heating in the presence of a small percentage of an aldehyde at a temperature above 100° and below the point where destruction of the protein occurs. This last stabilizing treatment also improves materially the color and flexibility of films formed from such dispersions. Heat treatment of aqueous alcoholic zein dispersions containing as little as 1 or 2 percent of an aldehyde and as much as 50 percent of water increases their resistance to gelation manyfold. Simple addition of such small amounts of aldehyde without heat treatment has little stabilizing effect. Aqueous acetone and aqueous dioxane dispersions of zein are likewise stabilized by an autoclave-aldehyde treatment.

Amino acid composition of cottonseed globulin preparations, T. D. Fontaine, H. S. Olcott, and A. Lowy (*Indus. and Engin. Chem. 34 (1942), No. 1, pp. 116–118*).—The globulins contained approximately 18 percent combined dicarboxylic acids (by amide nitrogen determination), 12 percent arginine, 9 percent leucine, 8 percent phenylalanine, 6 percent valine, 5 percent lysine, 3 percent each of histidine, methionine, tyrosine, serine, and threonine, 2 percent isoleucine, and 1 percent each of tryptophan and cystine.

Estudio sobre la composicion quimica de la semilla y torta de semilla de algodonero [The chemical composition of cottonseed and cottonseed cake], E. F. Paulsen (*Argentina Min. Agr., Junta Nac. Algodón, Bol. Mens.* No. *89–90 (1942), pp. 289–293*).

Recovery of oil from whole cotton, E. L. Powell and F. K. Cameron. (Univ. N. C.). (*Indus. and Engin. Chem., 34 (1942), No. 3, pp. 358–359, illus. 1*).—The authors found that objectionable coloring matter in the stems and cusps could be removed from whole cotton by aqueous solutions of sulfides or sulfites. After treatment with a sulfide, organic solvents recovered an oil easily bleached by standard adsorbents. A refined oil was thus obtained from whole cotton which met standard specifications and the requirements of the American market.

Heat denaturation of protein in soybean meal, A. C. Beckel, W. C. Bull, and T. H. Hopper. (U. S. D. A.). (*Indus. and Engin. Chem., 34 (1942), No. 8, pp. 973–976, illus. 2*).—Heat and moisture are shown to cause progressive insolubilization of the protein in soybean meal, and this denaturation is nearly quantitative in 2.5 hr. at 127° C. and 100 percent relative humidity. The change in color of the soybean meal was found not related directly to the protein denaturation.

The insoluble, denatured, proteinaceous material has been plasticized, offering the possibility of new soybean plastics.

Cottonseed meal in phenolic plastics, F. Rosenthal. (Tenn. Expt. Sta.). (*Indus. and Engin. Chem., 34 (1942), No. 10, pp. 1154–1157, illus. 4*).—The author states that cottonseed meal increases the flow of phenolic compounds when substituted for an inert filler. Compounds containing equal weights of phenolic resin, cottonseed hulls, and cottonseed meal afford a reduced raw material cost of 20.5 percent as compared to that of 50: 50 resin: filler compounds. They are considered to have favorable flow and cure-time properties at temperatures between 320° and 360° F. After proper processing, their water absorption in 24 hr. is 0.8 percent, and their strength characteristics approach those of commercial phenolic compounds.

Protein-aldehyde plastics: Combination of formaldehyde with acid casein and with rennet casein, D. C. Carpenter and F. E. Lovelace. (N. Y. State Expt. Sta.). (*Indus. and Engin. Chem., 34 (1942), No 6, pp. 759–763, illus. 5*).—The combining ratios between formaldehyde and acid casein and rennet casein were established over a concentration range up to 6.63 percent formaldehyde. Acid and rennet casein differ in the binding of formaldehyde. The general law applicable to both acid and rennet casein, relating bound formaldehyde to total formaldehyde employed, is shown to be the adsorption law, $X=KC^n$, in the concentration range investigated.

The results indicate that some 30 percent more aldehyde is bound than can be accounted for on the basis of combining with α-amino, side-chain amino, and amide groups. It is suggested that aldehyde combination with the hydroxy acids (serine, threonine, and β-hydroxyglutamic acid) of the protein may take place, and that acetal-like compounds will result which will form $—O—CH_2—O—$ or $—O—CH_2—O—CH_2—O—$ bridges and thus unite the side chains of protein molecules. Trioxymethylene rings, formed from formaldehyde and enolized $C=O$ groups of the protein, may join protein plastic molecules together, further utilizing aldehyde. Models of the types of structure are given.

Algunos usos practicos de las habichuelas soya en el hogar y en la industria [Some practical uses of the soybean in the home and in industry], J. H. Ramírez (*Agr. Expt. [Puerto Rico Univ. Sta.], 2 (1942), No. 6, pp. 2–3, 6*).—This brief popular review discusses the food value, preparation, and use of soybean meal, soybean milk, and soybean oil.

Soybean protein: Adhesive strength and color, A. K. Smith and H. J. Max. (U. S. D. A.). (*Indus. and Engin. Chem., 34 (1942), No. 7, pp. 817–820, illus. 2*).—The adhesive strength, hydrolytic cleavage with sodium hydroxide, and dispersion characteristics of soybean protein are interrelated. Undenatured soybean protein gives low adhesive values when dispersed in alkaline salts but high adhesive values when dispersed in sodium hydroxide. A mild hydrolytic treatment of soybean protein with sodium hydroxide will change the dispersibility of soybean protein so that it will have good adhesive strength when dispersed in alkaline salts but not so good as the undenatured protein dispersed in sodium hydroxide. The dithionates ($Na_2S_2O_4$ and ZnS_2O_4) are the best agents so far discovered for bleaching soybean protein. Coated paper which shows the undenatured soybean protein to have higher adhesive strength and a lighter color than has a good grade of commercial casein has been prepared in the laboratory.

Phosphatides from soybean oil, M. H. Thornton and H. R. Kraybill. (Ind. Expt. Sta. and U. S. D. A.). (*Indus. and Engin. Chem., 34 (1942), No. 5, pp. 625–628, illus. 1*).—The adsorption method was applied to the refining of soybean oil, and a procedure for the recovery of the adsorbed material is outlined. The phosphatide material adsorbed was recovered by successive extractions with acetone, ether, absolute ethanol, and 50 percent ethanol. The acetone extract consisted largely of oil, together with some phosphatides, sterols, and sterol glucosides. The ether extract was made up of material with physical properties the same as those usually ascribed to phosphatides, but the P:N ratio was approximately 2:1. It contained more cephalin than lecithin. Extraction of this material with absolute ethanol resulted in a viscous liquid fraction, soluble in acetone, and a good emulsifying agent. The material extracted from the adsorbent by absolute ethanol had a P:N ratio of about 1:1 and contained more lecithin than cephalin. The choline and aminoethanol contents of this fraction indicated at least 50 percent true phosphatides. The material extracted from the adsorbent by 50 percent ethanol also contained lecithin and cephalin, as well as other material, of an acidic nature, which yielded much sugar upon hydrolysis with acids. This substance had marked foaming properties.

Analysis of extracts of various layers of a column indicated that the adsorbed material was of constant composition throughout the column. Phosphatide fractions of similar composition were obtained from soybean oils prepared by the expeller, solvent, and hydraulic press processes. Oil refined by the adsorbent method contained approximately 30 percent as much of the nitrogen as did the crude oil, but only a trace of phosphorus.

Polymerization of drying oils, W. C. AULT, J. C. COWAN, J. P. KASS, and J. E. JACKSON. (U. S. D. A.). (*Indus. and Engin. Chem., 34 (1942), No. 9, pp. 1120–1123, illus. 2*).—Rates of polymerization of esters of pure octadecatrienoic acids found in natural and synthetic drying oils at 275° C. were determined, and the influence of geometric configuration on the rates was noted. This work gave additional evidence to support the observation of noncorrelation between the speed of drying and the speed of gelation of certain synthetic oils.

A simplified interpretation of the 1,4-diene mechanism for the polymerization of the conjugated trienoic acids is presented, and possible structures to account for the properties of the polymerized products are suggested.

Solvent extraction of tung oil, W. G. ROSE, A. F. FREEMAN, and R. S. MCKINNEY. (U. S. D. A.). (*Indus. and Engin. Chem., 34 (1942), No. 5, pp. 612–614, illus. 2*).—The authors describe a large-scale laboratory extractor (22 l. extracting and boiling vessels) utilizing the Soxhlet principle of intermittent siphoning of the solvent from the extraction vessel but quite different from the Soxhlet extractor in mechanical design. They also describe an apparatus in which the oil, after most of the solvent has been recovered by distillation, is sprayed onto a steam-heated coil in an evacuated jacket and collected in a flask attached to the lower end of the vertical jacket.

Upon standing for a short time, the solvent-extracted-oil solidified as a result of isomerization of the α-eleostearic glyceride to the solid β form. This isomerization was observed with the oils resulting from the extraction of ground tung kernels and from the extraction of the expeller press cake. It was ascertained, however, that solvent-extracted tung oil could be rendered permanently liquid when subjected to heating for approximately 30 min. at 200° C. The quality of the oil extracted from ground tung kernels and press cake was not inferior to that of pressed oil, although the heat treatment bodies the oil to a certain extent and correspondingly reduces its iodine value.

Drying of linseed oil paint: Coordinated metal soaps as oxygen absorption and drying catalysts, D. G. NICHOLSON. (Univ. Ill.). (*Indus. and Engin. Chem., 34 (1942), No. 10, pp. 1175–1179, illus. 7*).—Cobaltous o-phenanthroline oleate was used as a drying material in linseed oil paints variously pigmented. In all the induction period was materially shortened.

l-Pimaric acid content of longleaf and slash pine oleoresins, B. L. Davis and E. E. Fleck. (U. S. D. A.). (*Indus. and Engin. Chem., 35 (1943), No. 2, pp. 171–172*).—The oleoresin obtained from slash pine contained from 7 to 10 percent less *l*-pimaric acid than was found in longleaf pine oleoresin. Scrape contained at least as much *l*-pimaric acid as ordinary pine oleoresin. Oleoresin obtained from streaks treated with 10 percent sulfuric acid did not differ greatly from oleoresin obtained in the normal manner

Removal of contaminants from pine oleoresin, R. V. Lawrence. (U. S. D. A.). (*Indus. and Engin. Chem., 34 (1942), No. 8, pp. 984–987, illus. 1*).—The use of dilute mineral acid for washing diluted filtered oleoresin, badly contaminated with iron, made it possible to produce rosin of much lighter color than can be obtained from the unwashed oleoresin. As much as 85 percent of the metallic contaminants present in crude oleoresin was removed by washing with dilute mineral acid. No appreciable difference in the effectiveness of the acids (hydrochloric, nitric, and sulfuric) was noted

Ester gums from rosin and modified rosins, W. D. Pohle and W. C. Smith. (U S. D. A). (*Indus. and Engin. Chem., 34 (1942), No. 7, pp. 849–853, illus. 4*).—A laboratory method has been described for preparing ester gums under conditions so controlled that the products can be compared with respect to color, softening point, and rate of esterification.

Above 260° C. temperature had a marked effect on the rate of esterification. Ester gums made from longleaf and slash pine rosins had the same properties. There was no correlation between the softening point of the rosin or fused acid and the softening point of the ester gum. Oxidation of the unstable rosin acids darkened the ester gum and raised the softening point of the ester gum. Abietic acid ester gum was lighter in color than the fused abietic acid, and the softening point was lower than that of gum rosin ester gum. Esther gum made with vacuum-distilled gum rosin was lighter in color and softer than the gum rosin ester gum. The vacuum-distilled rosin did not esterify so rapidly as gum rosin. Hydrogenated rosin ester gum and commercial stabilized rosin ester gum was softer than gum rosin ester gum. Esther gum made from stabilized rosin or stabilized rosin acids had a tendency to crystallize from a cold ethyl acetate solution, while ester gums made from unstabilized rosins did not show this tendency. Gum rosin esterified more rapidly than wood rosin. Crystalline acids from commercial stabilized rosin and abietic acid did not react so rapidly with glycerol as gum rosin.

d-Lactic acid fermentation of Jerusalem artichokes, A. A. Andersen and J. E. Greaves. (Utah Expt. Sta). (*Indus. and Engin. Chem., 34 (1942), No. 12, pp. 1522–1526, illus. 8*).—Jerusalem-artichoke tubers furnish the growth requirements of the *Bacillus dextrolacticus* culture and also fermentable carbohydrate. The usual addition of malt sprouts or other growth-promoting material is omitted. Hydrolysis of the tuber material is necessary, but readily accomplished by heating to 95° C. for 1 hr. at a pH of 2.0. The addition of glucose (or levulose) to a diluted hydrolyzate improves the quality of the final product without decreasing the rate of fermentation. The addition of ammonium sulfate and potassium dihydrogen phosphate to the medium is essential for a rapid and complete fermentation. The optimum concentration of ammonium sulfate is 3.0 gm. per liter and of potassium dihydrogen phosphate, 0.50 gm. per liter. Aeration of the fermenting medium proved to be necessary for a rapid and complete fermentation. Fourteen percent sugar solutions were fermented to dextrolactic acid in from 4 to 5 days with a yield of from 92 to 94 percent.

Production of a palatable artichoke sirup, D. T. Englis and H. A. Fiess. (Univ. Ill.). (*Indus. and Engin. Chem., 34 (1942), No. 7, pp. 864–867*).—Organic exchangers are used. The aqueous extract from the dried material is treated with a cation exchanger, using the hydrogen cycle, and the pH is lowered to a value near 3.5. The solution is drawn off, treated under a pressure of from 15 to 20 lb. for 30 min., and decolorized with an active carbon; the acid content is reduced with an anion exchanger, and the solution is concentrated to a sirup of 80 percent solids. Sirup superior to that of earlier methods is produced. After 20 complete cycles the exchangers showed no apparent loss in efficiency.

Influence of moisture on browning of dried whey and skim milk, H. Doob, Jr., A. Willmann, and P. F. Sharp. (Cornell Univ.). (*Indus. and Engin. Chem., 34 (1942), No. 12, pp. 1460–1468, illus. 14*).—Two methods of extraction for determination of brown color are described. In the first, applicable to whey only, an aqueous suspension of the product is clarified with alcoholic zinc chloride at 50° C.; in the second, applicable to both dried milk and whey, a clear extract is obtained by extracting the product at room temperature with a solution containing 300 gm. sodium chloride and 10 gm. $Na_3PO_4.12H_2O$ per liter of water. Slightly more color is extracted from dried whey by the alkaline solution. In tests on both experimental and commercial dried wheys, color developed on aging was found associated with high osmotically held moisture, high titratable acidity, low pH, and low lactose content. Browning of both dried milk and whey was shown to be affected by relative humidity, temperature, and time of storage. At least one stage of the browning reaction appeared to be autocatalytic.

Effect of neutralization on sour milk in the manufacture of dried skim milk, F. Hillig (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 1, pp. 253–264, illus. 1*).—In addition to the determination of lactic acid and alkalinity of the ash, moisture, ash, water-soluble ash, and water-insoluble ash may be determined to obtain supplementary information. The most striking difference introduced by neutralization was a sharp increase in alkalinity of the ash. Lactic acid was determined in an ether extract.

Research in enology, W. V. Cruess. (Univ. Calif.). (*Inst. Food Technol. Proc., Minneapolis, Minn., 1942, pp. 152–161*).—This paper was given as the acceptance address upon presentation to the author of the Nicholas Appert Medal Award of the Institute of Food Technologists for 1942; this was the first of the series of yearly awards established by the Chicago section of the I. F. T.

Cellulose content of cotton and southern woods, W.-H. Wan Chen and F. K. Cameron. (Univ. N. C). (*Indus. and Engin. Chem., 34 (1942), No. 2, pp. 224–225*).—The authors state that about 60 percent of the α-cellulose in whose cotton comes from the lint, 30 percent in about equal quantities from stems and from cusps. The α-cellulose content of whole cotton, generally, was found higher than that of woods, the cellulose content of stems and cusps, comparable to that of tree growths.

The proximate chemical constituents of citrus woods, with special reference to lignin, F. M. Turrell and P. L. Fisher. (Calif. Citrus Expt. Sta.). (*Plant Physiol., 17 (1942), No. 4, pp. 558–581, illus. 3*).—Lignin determinations on the sapwood of Washington Navel orange, Valencia orange, Eureka lemon, and Marsh grapefruit scions on sweet- and sour-orange rootstocks were made by the Phillips method (E. S. R., 67, p. 206) and by the Ritter sulfuric acid method (E. S. R., 74, p. 593). The lignin content of various species and varieties of healthy citrus woods on various rootstocks assayed from 12.65 to 17.35 percent of the dry weight of the wood by the Phillips method and from 12.99 to 21.82 percent by the Ritter method. Valencia orange scions contained the least lignin; Eureka lemon scions on rough-lemon rootstock, the most. Psorosis-infected wood gave rather irregular results, although the average lignin content of this wood was about the same as that of healthy wood. Percentages of other constituents of the diseased wood differed from those of healthy wood. Comparative determinations of some other components are also reported.

Feed yeast and industrial alcohol from citrus-waste press juice, A. J. Nolte, H. W. von Loesecke, and G. N. Pulley. (U. S. D. A.). (*Indus. and Engin. Chem., 34 (1942), No. 6, pp. 670–673, illus. 3*).—The authors describe a method for the production of feed yeast from the press juice of cannery waste dehydration plants. An average yield of 46 percent of dry yeast, based on the total sugar content of the press juice, was obtained. *Torula utilis* was found to be the most suitable of the yeasts tried for protein synthesis from the waste juice of dehydration plants. Alcohol can be obtained from the press juice with an average yield of 91 percent of the theoretical. Estimated raw material cost is less than half that of blackstrap molasses.

Studies on pituitary lactogenic hormone, VII, VIII. (Univ. Calif.). (*Jour. Biol. Chem. 146 (1942), No. 2, pp. 627–631, 633–638*).—The preceding papers of this series have been noted (E. S. R., 86, p. 376).

VII. *A method of isolation,* C. H. Li, M. E. Simpson, and H. M. Evans.—The authors describe a method for the isolation of pituitary lactogenic hormone from sheep or ox glands. The preparation was found to be chemically pure by electrophoretic, solubility, and diffusion tests and had an activity of from 25 to 30 International Units per milligram.

VIII. *Diffusion and viscosity measurements,* C. H. Li.—From the measurements reported in this paper, the optical rotation of the lactogenic hormone was found to have a linear relation to the concentration; the specific rotation, —40.5°. The partial specific volume of the hormone was shown to be 0.721. The diffusion constant, D_{20w}, was determined by the sintered glass membrane method as 9.0×10^{-7} cm.^{2} per second. From viscosity data, the dissymmetry constant of the hormone was found to be 1.29. With the diffusion constant and dissymmetry constant as herein determined, the molecular weight of the hormone is computed as 22,000.

Phosphine and sludge digestion, W. Rudolfs and G. W. Stahl. (N. J. Expt. Stas.). (*Indus. and Engin. Chem., 34 (1942), No. 8, pp. 982–984, illus. 1*).—The possible production of phosphine during digestion of sewage solids was investigated by adding various organic and inorganic phosphorus compounds to actively digesting sludge mixtures. All phosphorus compounds studied gave qualitative tests for phosphine at various stages during digestion, but none were confirmed when the gas produced was oxidized with chlorine and the phosphorus determined as phosphomolybdate, using silica-free agents.

Acid waste treatment with lime, W. Rudolfs. (N. J. Expt. Stas.). (*Indus. and Engin. Chem., 35 (1943), No. 2, pp. 227–230, illus. 6*).—The wastes studied caused sewer corrosion, interference with biological sewage treatment processes, and stream pollution, and affected aquatic life. The wastes consisted primarily of mixtures of sulfuric, nitric, and hydrochloric acids, with some alkalies, solvents, and poisons present. The character and volumes fluctuated materially. Neutralizing agents used for experimental purposes were calcium and magnesium hydrates, quicklimes, limestones, soda ash, caustic soda, and their combinations. With nitrocellulose waste it was found that a combination of dolomitic hydrate with soda ash was preferable to lime, soda ash, or caustic soda alone. The dry weight of sludge decreased with increasing quantities of soda ash, but the volume of sludge increased and the ease of dewatering decreased. The reaction time required for complete neutralizaion increased with increasing quantities of soda ash.

Pressure-measuring device for moderate vacua, E. R. Kline. (Univ. Conn.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 7, p. 542, illus. 1*).—A modified McLeod gage, of which the design involves the new principle of the use of a nonvolatile liquid of low density in such a gage, is described and its construction is shown in a drawing specifying the essential dimensions. The operating liquid which was found to give best results was olive oil subjected to prolonged evacuation at 100° C. to remove volatile solvents and moisture. A formula showing the relation between the reading of the new gage and mercury pressure in millimeters is given, together with a calibration table.

Great precision is not claimed for this apparatus but it was proved sufficiently accurate for vacuum distillations.

Apparatus for continuous concentration of a solution under reduced pressure, B. L. Davis. (U. S. D. A.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 7, p. 548, illus. 1*).—The essential novelty of this set-up consists in the internal extension of the sidearm of the receiving flask in the form of a tube reaching nearly to the lowest point of the spherical part when the flask is supported in the customary manner in a funnel placed to hold the receiver and to carry off the drainage of the cooling water. The aspirator thus draws off the solvent as distilled over. The usual Claissen flask with capillary leak to control foaming is used, together with a dropping funnel which provides for intermittent or continuous feeding of the solution to be concentrated.

Simplified apparatus for catalase determination, R. R. Thompson. (N. Y. State Expt. Sta.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 7, p. 585, illus. 1*).—By using a modification of the Tressler procedure (E. S. R., 76, p. 297), eliminating the fermentation tube and substituting the apparatus illustrated, the extent of inactivation can be determined accurately in 2 min., and the apparatus is simple to construct and inexpensive. Such a method should have value, especially in food-processing plants where it is necessary to make catalase determinations in a minimum period of time.

A special feature of the apparatus is a re-entrant crease or ridge diametrically crossing the bottom of the reaction flask to provide separated sections for the enzyme sample and the hydrogen peroxide upon which it is to act. Sample and substrate are not mixed until the apparatus, which includes a manometer inserted through the stopper of the flask, has been brought to 20° C. in a thermostatically controlled water bath. A 2-min. shaking period then brings about the reaction.

Reproducibility of pH measurements with glass electrode hydrogen-ion meters, R. U. Bonnar (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 4, pp. 978–980, illus. 1*).—All operators secured convergence to 0.01 pH in the measurements, even of samples which were very poorly buffered. Temperature-sensitive systems may yield discrepancies up to 0.3 pH under the range of conditions existing among several laboratories. Systems permitting of consistent measurements (constant ionic strength and reasonable liquid-junction potentials) should show mutual agreement within ±0.05 pH.

The practical importance of ionic strength, liquid-junction, specified surface, and temperature effects remains to be evaluated. The use of systems of multiple standards will require greater care hereafter both in defining and in preparing such standards.

A method of studying the movement of respiratory gases through waxy coatings, R. C. Nelson. (Minn. Expt. Sta.). (*Plant Physiol., 17 (1942), No. 4, pp. 509–514, illus. 2*).—The author describes a microgas analyzer, together with a technic for testing the permeabilities of waxy coatings to respiratory gases, using a cucurbit fruit as a test object. Tests of three types of waxy coatings indicated that the permeabilities of the coatings to oxygen and carbon dioxide were critical in determining the success of the treatment, the ideal situation in this case being a high permeability to oxygen accompanied by low permeability to carbon dioxide.

Arylamine salts as derivatives for identifying aromatic sulfonic acids, O. C. and V. H. DERMER. (Okla. A. and M. Col.). (*Jour. Organic Chem., 7 (1942), No. 6, pp. 581–586*).—The authors prepared and determined the melting points of a considerable number of the aniline, *o*-toluidine, and *p*-toluidine salts. With these values are included a compilation of like data, with 56 citations.

[Reports of referees and associate referees on analytical methods] (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 4, pp. 852–854, 857–867, 892–893*).—Reports have been contributed from the State and Federal institutions respectively noted: Feeding stuffs, by L. S. Walker (pp. 852–854) (Vt. Expt. Sta.); ash, by J. L. St. John (pp. 857–864) (Wash. Sta.); fat in cooked animal feeds containing cereals (acid hydroysis), by S. B. Randle (pp. 864–867) (Ky. Sta.); soluble chlorine in feeding stuffs, by J. W. Kuzmeski (pp. 870–874) (Mass. Sta.); manganese in stock feeds, by J. B. Smith (pp. 892–893) (R. I. Sta.); and adulteration of condensed milk products and cod-liver oil, by P. B. Curtis (p. 893) (Ind. Sta.).

Determination of the drying rates of thin films, G. RIEGER and C. S. GROVE, JR. (Univ. Minn.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 4, pp. 326–333, illus. 12*).—An apparatus, which can easily be constructed from equipment available in any laboratory, has been devised for measuring the drying rates of thin films. This apparatus and technic were applied to a study of thin nitrocellulose films, the maximum dry weight of which was about 0.02 gm.; the area, about 13 cm.^{2} (2 sq. in.); the total solvent content, about 300 mg.; and the drying time, about 20 min. The drying rates of these selected films are presented in graphs. The suggested apparatus and technic were shown to give satisfactory and reproducible results.

Ash "free from carbon," J. L. ST. JOHN. (Wash. Expt. Sta.). (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 4, pp. 969–973, illus. 3*).—In view of the facts and observations here recorded and of the fact that even at a temperature of 700° C. many samples of ash contain appreciable quantities of visible carbon, it is concluded that neither a macroscopic observation of the ash nor a judgment by the analyst as to whether or not the ash is free from carbon can be used to determine the optimum degree of ashing or the temperature or length of time of combustion necessary for "complete" ashing. Ashing should be done under definitely specified conditions. The temperature at which ashing is done might well be further lowered to 600°.

Accurate determination of calcium without reprecipitation in the presence of aluminum, iron, magnesium, manganese, phosphorus, sodium, and titanium, W. H. MCCOMAS, JR., and W. RIEMAN III. (Rutgers Univ.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 12, pp. 929–931*).—A major source of error in the determination of calcium in a limestone is the postprecipitation of magnesium. This contamination may be diminished by decreasing the digestion. On the other hand, too short a digestion may cause an incomplete yield of a nonfilterable precipitate. These difficulties were avoided by slow precipitation of calcium oxalate and digestion for 5 min. in a hot, strongly acid solution, rapid cooling of this solution, adjusting the pH to 3.70, and a final digestion of 30 min. at 25° C. Procedures for the determination of calcium (1) in a solution and (2) in a limestone are based upon the indicated principles. Other sources of minor errors and means for their avoidance are discussed.

Effect of method of solution on determination of P_2O_5 in sample containing organic matter, A. E. HOFFMAN and P. CALDWELL (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 1, pp. 206–208*).—Solution of the sample in aqua regia at temperatures below boiling was found to give results very much lower than those obtained when the sample was oxidized in concentrated sulfuric acid with the subsequent addition of sodium or potassium nitrate. A sample of cottonseed meal, for example, yielded only 0.63 percent of phosphoric anhydride when the aqua regia method was used but was found by the treatment with sulfuric acid and nitrate to contain 3.07 percent.

Direct determination of sulfur, G. L. MACK and J. M. HAMILTON. (N. Y. State Expt. Sta.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 7, pp. 604–606*).—An ammoniacal cuprous sulfate reagent is prepared by reducing a solution of cupric ammonium sulfate with hydroxylamine hydrochloride. The reaction of this reagent upon elemental sulfur in acetone solution to form colloidal cuprous sulfide has been made the basis of a turbidimetric method for the direct determination of sulfur. The reagent was found to be capable of detecting 1 μg. of sulfur in 10 cc. of solution. The determination is fairly specific and accurate. The rapidity with which a large number of samples can be analyzed makes it especially useful for routine work. The method has been applied particularly to the analysis of sulfur in spray residues.

Separation of copper, lead, and zinc with salicylaldoxime, L. P. BIEFELD and W. B. LIGETT. (Purdue Univ.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 4, pp. 359–361, illus. 1*).—Zinc salicylaldoximate begins to precipitate at pH 5.8, is completely precipitated in the range from 7.1 to 8.1, and is again soluble above pH 9.7 if the pH is regulated with ammonia. Copper, lead, and zinc in the same solution may be separated with salicylaldoxime by precipitating the copper in weakly acidic solution, filtering it off, and then making the filtrate strongly ammoniacal to cause precipitation of the lead complex. The separation of lead from zinc in highly ammoniacal solution is improved by the addition of much ammonium nitrate, in the presence of which a wide range of ammonia concentration may be used to prevent coprecipitation of zinc salicylaldoximate while still permitting complete precipitation of the lead. Zinc cannot be quantitatively precipitated as the salicylaldoximate in the strongly ammoniacal filtrate from the lead separation. It may be determined in the filtrate by precipitation and weighing as $ZnNH_4PO_4$.

Determination of selenious acid and selenites: A rapid volumetric method, D. F. ADAMS and L. I. GILBERTSON. (Wash. State Col.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 12, pp. 926–927*).—The method consists in the oxidation of the selenite ion to selenate ion in nitric acid solution by an excess of standard bromate solution, which is in turn backtitrated with standard arsenite solution, Fast Red B as indicator.

Interlaboratory comparison of absorption spectra by the photoelectric spectrophotometric method.—Determinations on chlorophyll and Weigert's solutions, F. P. ZSCHEILE, C. L. COMAR, and G. MACKINNEY. (Ind. Expt. Sta. and Calif. Univ.). (*Plant Physiol., 17 (1942), No. 4, pp. 666–670*).—This comparative study indicated that agreement of results is obtainable by photoelectric spectrophotometric procedure on two instruments, and that discrepancies in the chlorophyll absorption are relatively minor in comparison with those reported during the last 10 yr.

Analysis of plant extracts for chlorophylls a and b by a photoelectric spectrophotometric method, C. L. COMAR and F. P. ZSCHEILE. (Purdue Univ.). (*Plant Physiol., 17 (1942), No. 2, pp. 198–209, illus. 1*).—An acetone extract is made from fresh leaf material. The fat-soluble pigments are transferred to ether, the acetone removed, and the solution dried with sodium sulfate. Spectroscopic analysis for chlorophyll *a* and chlorophyll *b* is made at wavelengths 6,600 and 6,425 a. u. The reliability of values obtained from other wavelengths depends considerably upon the carotenoid content. The chemical precautions and instrumental conditions essential for quantitative results are discussed.

The quantitative determination of lanthionine, W. C. Hess and M. X. Sullivan (*Jour. Biol. Chem., 146 (1942), No. 1, pp. 15–18*).—Lanthionine is converted to cysteine by boiling with hydriodic acid. Lanthionine formed by dilute alkali treatment of a protein, such as wool or lactalbumin, can be quantitatively estimated colorimetrically by first hydrolyzing the lanthionine-containing protein with HCl. The cystine present can be determined by the Sullivan procedure (E. S. R., 70, p. 444) without interference from lanthionine. Then by hydrolysis of the protein with hydriodic acid the total cysteine can be determined. The difference gives the cysteine derived from lanthionine. Multiplying by the factor 1.72 gives the lanthionine.

Colorimetric determination of serine, M. J. Boyd and M. A. Logan (*Jour Biol. Chem., 146 (1942), No. 2, pp. 279–287, illus. 1*).—The formaldehyde formed by the action of periodate on serine is quantitatively distilled from the reaction mixture, condensed with 1,8-dihydroxynaphthalene-3,6-disulfonic acid, and measured colorimetrically with an error of not more than 1 to 2 percent. This procedure was applied to known amino acid mixtures, acid hydrolyzates of purified casein, collagen, salmine, crystalline egg albumin, and hemoglobin. Liberation and destruction of serine during hydrolysis of proteins was studied.

Determination of volatile fatty acids, F. Hillig and L. F. Knudsen (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 1, pp. 176–195*).—A method evolved from that of Dyer (E. S. R., 37, p 13) is proposed for the determination of volatile fatty acids by means of steam distillation under conditions carefully controlled both as regards apparatus and manner of distillation. The data presented show that from one to four acids can be satisfactorily determined, formic acid being one of the acids present in any four-acid mixture. The method is not time-consuming. The apparatus can be readily constructed from material in the laboratory, an essential feature being an electric steam generator in which the heating element is a coil of resistance wire immersed directly in the water and connected in series with a rheostat. From the four-acid mixture, acetic, propionic, butyric, and isobutyric acids, four equations showing the proportions of each acid in terms of the total acidity in a 50-cc. distillate and in each of three subsequent 200-cc. distillates were determined for the set-up of empirical conditions specified.

Quantitative field test for estimation of peroxidase, W. B. Davis. (U. S D. A.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 12, pp. 952–953*).—The time required for the peroxidase present in the sample to effect the oxidation of a fixed quantity of a potassium iodide starch solution buffered with an acetate buffer at pH 4.7 and containing a small fixed quantity of sodium thiosulfate is measured by noting the sudden appearance of the starch iodine color reaction. The reciprocal of this time is a measure of the enzyme activity. The determination is used as a measure of the effectiveness of the blanching treatment preceding dehydration of vegetables.

The determination of free iron oxides in soil colloids, M. Drosdoff. (U. S D. A.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 131–132*).—A modification of the sulfide method for the determination of free iron oxides in soil colloids is proposed that is readily adapted to routine determinations. Data obtained by the method are given and compared with those obtained with the longer procedure, with particular attention to the colloids found in the soils of the southeastern United States.

Grinding of fertilizer samples for analysis, W. H. Ross and J. O. Hardesty. (U. S. D. A.). (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 1, pp. 238–246, illus. 2*).—A modified hammer mill for fertilizer samples is described. The average time required to grind 14 samples of various fertilizer materials and mixtures to a suitable fineness for analysis was less with the modified hammer mill than with the mortar and pestle, bucking board, Braun plate mill No. 7, Butt roller mill, and two commercial laboratory hammer mills. The average percentage loss of the sample during the process of grinding was least with the modified hammer mill and greatest with the mortar and pestle. It was further found that a dry hygroscopic material can be ground in the modified hammer mill on a humid day without appreciable change in its moisture content.

The problem of moisture determination in fertilizers, C. W. Whittaker and W. H. Ross. (U. S. D. A.). (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 1, pp. 132–142, illus. 5*).—The authors present a general discussion of moisture-determination methods from simple oven-drying of the sample to treatment with an alkyl magnesium haloid and measurement of the evolved gas as an indicator of the quantity of water present. The Bidwell and Sterling method (E. S. R., 53, p. 805) is considered suitable for organic fertilizer ingredients and for urea per se, but urea in a mixed fertilizer will hydrolyze to free ammonia and carbon dioxide at temperatures lower than those necessary in distillation methods. Methods of extraction with ether or with ethyl or methyl alcohols are discussed in some detail, as are electrical and chemical methods. By rapidly drawing air heated to a constant temperature through the sample, fast drying is obtainable at temperatures as low as 60° C. Equipment embodying this principle of rapid removal of moisture at a low temperature has been developed and will be described later.

Availability of phosphorus in ammoniated phosphates; laboratory versus crop—a review, R. M. Jones and L. V. Rohner (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 1, pp. 195–205, illus. 2*).—The data assembled in this review indicate that phosphoric anhydride found to be insoluble or unavailable by the chemical method is available to plants on soils having a pH of 6 or under. Soils in this classification constitute 90 percent of tillable land in the States that consume 75 percent of the fertilizer. The A. O. A. C. method, therefore, places a burden of extra cost on the fertilizer consumer by (1) limiting unduly the amount of the lowest cost nitrogen (solutions containing free ammonia) that can be used in fertilizer mixtures, and (2) making necessary the installation of expensive rehandling and cooling equipment to prevent formation of citrate-insoluble phosphoric anhydride. Some of the shortcomings of the present A. O. A. C. method can be overcome by reducing the size sample taken for analysis from 1 to 0.5 gm. A change in the present method to bring estimates of available phosphoric anhydride in ammoniated products more into line with the facts of influence of such products on crop growth is suggested.

Discrepancies between the response of cotton to phosphatic materials and their availability as determined by the Official method, W. B. Andrews. (Miss. Expt. Sta. et al.). (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 2, pp. 498–509*).—Cotton fertilizer experiments indicated that superphosphate makes more than enough more seed cotton than does tricalcium phosphate in acid-forming fertilizers to pay for the superphosphate; that dicalcium phosphate is a good source of phosphorus in acid-forming fertilizers on acid soils, but a poor source on soils high in lime; that basic slag may or may not be a good source of phosphorus with sulfate of ammonia as the source of nitrogen on acid soils, and that it is a poor source of phosphorus on limed soil; that ammoniated superphosphate containing 2.4 percent NH_3 is a good source of phosphorus in acid-forming fertilizers on acid soils; that ammoniated superphosphate containing 3.0 percent (or more) NH_3 is less valuable than superphosphate in acid-forming fertilizers and much less valuable in neutral fertilizers; and that the phosphorus in monocalcium phosphate is fixed in the soil in a more available form that it is when applied in di- and tricalcium phosphates. The present A. O. A. C. method for determining the availability of phosphates is said to give too high a rating to such materials as tricalcium phosphate when occurring in mixed fertilizers and to the ammoniated superphosphates that contain as much as 3.0 percent ammonia.

A rapid method for the determination of nitrogen in plant tissue, R. C. LINDNER and C. P. HARLEY. (U. S. D. A.). (*Science, 96 (1942), No. 2503, pp. 565–566*).—Use of 30 percent H_2O_2 in presence of concentrated H_2SO_4 was found to offer a remarkably fast and thorough method for digesting relatively small amounts of plant material, taking only about 5 min. and enabling the determination of total N (including nitrates) by standard nesslerization procedure with use of a photoelectric colorimeter of test-tube type. The cost is only about one-twelfth that of the Kjeldahl method, with equal accuracy. The solution obtained can also be used for determining P, K, Ca, and Mg rapidly, colorimetric methods for which the authors have worked out. Since leaf analysis offers the most promising means of diagnosing nutritional difficulties within the plant and also eliminates most of the uncertainty in determining fertilizer needs, it is hoped that, by adopting faster methods, leaf analysis as a tool in increasing crop production may come to be more widely used.

Rapid method for determining potassium in plant material, J. L. ST. JOHN and M. C. MIDGLEY. (Wash. Expt. Sta.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 4, pp. 301–302*).—The authors used a nitric-perchloric acid oxidation procedure similar to those of Gieseking, Snider, and Getz (E. S. R., 75, p. 153) and of Gerritz (E. S. R., 75, p. 156), but prefer chloroplatinate precipitation to the cobaltinitrite procedure used by the first-named authors. The nitric-perchloric digestion is quicker and less subject to losses than is that of ashing, but the precautions prescribed by Cook (E. S. R., 86, p. 734) and others with respect to thorough oxidation by nitric acid before addition of the perchloric acid are emphasized.

In addition to rapidity, ease of manipulation, and ease of obtaining satisfactory agreement of results, the method seemed to give better recovery in some instances than does the present Official method for plant material.

The chemical determination of nicotinic acid in plant materials, E. B. HALE, G. K. DAVIS, and H. R. BALDWIN. (Mich. Expt. Sta.). (*Jour. Biol. Chem., 146 (1942), No. 2, pp. 553–563*).—A modification of the *p*-aminoacetophenone procedure for determining nicotinic acid was investigated from the viewpoint of application to plant materials. The use of an appropriate blank was observed to be highly important. Concentration of the hydrolytic agent, alkali or acid, did not affect nicotinic acid values. Alkaline hydrolysis of an aqueous extract gave the most satisfactory results for the seeds and roots, while acid hydrolysis of the chlorophyll-containing part of the plant gave the lowest and most acceptable values. Alkaline or acid treatment was necessary for the complete utilization of nicotinic acid by the bacteria employed in microbiological assay. Chemical and microbiological assay values for a wide variety of plant materials varying from 2 to over 25 mg. percent of nicotinic acid were in agreement. Discrepancies encountered in the case of forage materials are discussed.

Application of the liquid extraction method for the determination of total organic acids in plant sap, T. L. ISAACS and T. C. BROYER. (Univ. Calif.). (*Plant Physiol., 17 (1942), No. 2, pp. 296–302, illus. 1*).—The authors used methods similar to those developed by Pucher, Vickery, and Wakeman at the Connecticut [New Haven] Station (E. S. R., 74, p. 295). They describe an apparatus for liquid extraction of ether-soluble organic acids of a design based upon a Soxhlet extractor described by Vickery and Pucher (E. S. R., 65, p. 9).

Methods for determination of moisture in tobacco, C. W. WOODMANSEE, K. E. RAPP, and J. S. MCHARGUE. (Ky. Expt. Sta.). (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 1, pp. 142–145*).—Nicotine was determined before and after drying in the electric air-oven at 100° C. for 3 hr. and in the 2 mm vacuum desiccator. The mean difference in nicotine due to drying is 2.1 times greater in the electric air-oven procedure than in the vacuum desiccator procedure. The 2-mm. vacuum desiccator method is recommended for accurate analyses, although the time required makes it impractical for rapid determinations. Drying in an electric air-oven at 100° for 3 hr. is suggested for rapid determinations.

Potassium in fruits and fruit products; Volumetric chloroplatinate method, H. W. Gerritz (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 1, pp. 232–238*).—A volumetric chloroplatinate method for the determination of potassium is presented which is adaptable to control work in jam and jelly plants. The reagents used are stable, and the apparatus required is simple, inexpensive, and readily obtainable. The potassium chloroplatinate is reduced in the Gooch crucible in which it was filtered. By this technic and the use of magnesium nitrate as an ash aid and of a modification of the Volhard chloride titration an analysis can be completed in less than 2 hr.

Rapid method for determination of small quantities of copper on apples when lead arsenate is also present, H. W. Rusk. (U. S D. A.). (*Jour Assoc. Off. Agr. Chem., 25 (1942), No. 4, pp. 980–987, illus. 1*).—Two methods of sample preparation are shown to be usable, namely, acid digestion of the peels and stripping of the whole apple with a solution containing nitric acid and ammonium nitrate. The latter is preferable when it is desired to determine the lead and arsenic. After either the copper is isolated with diphenylthiocarbazone, the complex formed with it is destroyed with nitric acid and potassium chlorate, and the copper is finally estimated in the form of carbamate by a photoelectric photometer. A standard deviation of less than 2 percent among replicate analyses may be expected.

Precision of flour moisture results between and within laboratories, W. F. Geddes and C. A. Anker. (Minn. Expt. Sta.). (*Cereal Chem., 19 (1942), No. 5, pp. 605–609*).—The vacuum-oven method gave a mean moisture value 0.06 percent higher than the 130° C. 1-hr. air-oven method in triplicate analyses by one laboratory of 151 flour samples containing from 9.8 to 14.4 percent moisture. The standard error for each method was 0.04 percent. Mean air-oven moisture values of 12.08, 12.09, 12.16, and 12.16 percent obtained by four laboratories in the analyses of 131 of the above samples were significantly different. For all laboratories combined the standard deviation for "within" samples was 0.09 percent as compared with a standard deviation of replicates of 0.04 percent. Accordingly, a difference of 0.2 percent in the means of two duplicate determinations of any 2 samples analyzed in the different laboratories would be significant; in the same laboratory a difference of 0.1 percent would be significant.

Report of the malt analysis standardization committee, A. D. Dickson. (U. S. D. A. and Univ. Wis.). (*Cereal Chem., 19 (1942), No. 2, pp. 249–251*).—The committee recommends that a factor of 23 be used in calculating degrees Lintner from ferricyanide titration where the procedure of the A. S. B. C. method for diastasis is used.

A viscometric determination of the optimum pH for the proteolytic activity of malt with gelatin as a substrate, J. R. Koch and Sister Mary Lauretta (*Cereal Chem., 19 (1942), No. 3, pp. 315–326, illus. 6*).—The proteolytic activity of malt at different pH values can be measured viscometrically, thus locating an optimum pH. A 20-percent drop in kinematic viscosity furnishes a desirable means of estimating proteolysis. It makes possible a determination at a given pH in 2 hr. or less, thereby saving time and eliminating the disturbing factors that enter into prolonged digestion reactions.

A voltammetric method for measuring the concentration of dissolved oxygen in dairy products, G. H. Hartman and O. F. Garrett. (N. J. Expt. Stas.). (*Jour. Dairy Sci., 25 (1942), No. 8, p. 721*).—The apparatus consisted of a capillary dropping mercury electrode and a saturated calomel half cell, a sensitive reflecting mirror galvanometer, a photoelectric cell and amplifier, and a thread and drum recorder marking the galvanometer deflection at minute intervals. The concentration of oxygen was found proportional to the gavlanometer deflection. The determination in milk may be made at a potential ranging from 0.8 to 1.2 v. A probable error of ±0.03 and a standard deviation of 0.18 of the mean oxygen in 21 samples of air-saturated whole milk of varying solids composition were found.

Titrimetric microdetermination of chloride, sodium, and potassium in a single tissue or blood sample, W. G. Clark, N. I. Levitan, D. F. Gleason, and G. Greenberg. (Univ. Minn. et al.). (*Jour. Biol. Chem., 145 (1942), No. 1, pp. 85–100, illus. 4*).—Procedures for the simultaneous determination of sodium, potassium, and chloride with a precision of 1 or 2 percent in samples of the order of 20 to 1,000 mg. are described. Chloride is driven out as hydrochloric acid by digestion in a closed system with strong sulfuric acid, and is collected in strong alkali. It is determined by a mercurimetric titration which gives a color change from colorless to blue. Sodium is precipitated as the sodium zinc uranyl acetate (E. S. R., 58, p. 608), the acetate being titrated with standard alkali to a phenolphthalein end point (each sodium atom equivalent to 9 atoms of alkali). Potassium is precipitated as chloroplatinate which is reduced with formate, and the liberated chloride is determined by mercurimetric titration, 3 chlorine atoms being equivalent to 1 of potassium.

METEOROLOGY

Weather study, D. Brunt (*New York: Ronald Press Co., [1942], pp. 215, illus. 50*).—A textbook of meteorology designed for those with no previous knowledge of the subject.

On international bibliographies of meteorology, H. Muller (*Amer. Met. Soc. Bul., 23 (1942), No. 10, pp. 407–410*).—A discussion familiarizing meteorological research workers with the standard general bibliographies in their field.

Fundamentals of physical climatology, V. Conrad (*Milton, Mass.: Harvard Univ., Blue Hill Met. Observ., 1942, pp. 121+, illus. 60*).—The eight lectures making up this volume are described as "selected chapters of physical climatology," so designed as to be comprehensible to a general audience as well as suitable for specialists.

Weather estimates from local aerological data; A preliminary report, C.-G. Rossby, V. Olivier, and M. Boyden (*Univ. Chicago, Inst. Met., Misc. Rpts. No. 2 (1942), pp. 47+, illus. 28*).

Precipitation variation in the United States, S. S. Visher (*Sci. Mo., 56 (1943), No. 4, pp. 364–369, illus. 8*).—Large variations in precipitation occur within the United States from year to year. The discussion, with accompanying eight maps, presents information for especially wet and dry years, summers and winters, compiled from data of the U. S. Weather Bureau and U. S. D. A. Soil Conservation Service over a 40-yr. period and from a large number of records.

The New Hampshire flood on June 14–15, 1942, C. C. McDonald (*Jour. Boston Soc. Civ. Engin., 30 (1943), No. 1, pp. 1–22, illus. 11*).—The object of this paper is to render available the data obtained on this storm and the flood that followed. Discussion of the general features of the storm and the flood, precipitation, determination of flood discharges, stages and discharges at stream gaging stations, and the effect of the Murphy Dam on the flood peak, and tabulations of detailed data are included.

A remarkable reversal in the distribution of storm frequency in the United States in double Hale solar cycles, of interest in long-range forecasting, C. J. Kullmer (*Smithsn. Misc. Collect., 103 (1943), No. 10, pp. 20+, illus. 26*).

Variations between ring chronologies in and near the Colorado River drainage area, E. Schulman (*Tree-Ring Bul., 8 (1942), No. 4, pp. 26–32*).—The author discusses the skeleton chronology map and its limitations, boundaries of a homogeneous dendrochronological area, long-lived trees, fluctuating areas of drought in different years, and supersensitive chronologies.

A survey of frost conditions in the Imperial Valley of California, W. C. Jacobs (*U. S. Dept. Com., Weather Bur., [1940?], pp. 31+, illus. 16*).

Lags and ranges of temperature in Hawaii, S. B Jones. (Univ. Hawaii). (*Ann. Assoc. Amer. Geog., 32 (1942), No. 1, pp. 68–97, illus. 18*).—The results of this study indicate that land masses as small as the Hawaiian Islands have important effects on the annual march of temperature, which are amplified by the mountainous character of the islands and steadiness of the winds. Temperature regimes like those of the ocean are most common on windward sides, but differences in the circulation of climatologic air, due to land forms, and shielding or cooling by cloud or rain complicate the intra-island patterns of seasonal lag and annual range. Inland stations may be more marine in temperature than some near windward coasts. The extent to which the oceanic regime is modified on the islands depends on factors to a considerable degree interchangeable. A sunny but windy station may yield somewhat the same temperature curve as a calm but cloudy one. The limitations of an empirical study make it difficult to go beyond an enumeration of possible explanations in such cases. Low annual ranges in Hawaii result from cool summers rather than warm winters, but abrupt truncation of the summer peak is uncommon there. A broad winter trough and a delayed spring rise—both at variance with the theoretical insolation for the latitude—are oceanic characters found at many island stations. Storage of heat in the sea water is adequate to explain these features. Variations in daily range with place and season are related to the factors controlling annual range and seasonal lag.

Mapa de las provincias climatológicas de la República Mexicana [Map of the climatological regions of the Mexican Republic], A. Contreras Arias (*[Tacubaya, Mex.]: Inst. Geog., 1942, pp. [82], illus. 6*).—Included with the colored map are discussions of the various climatic factors, a comparison of the map with the distribution of the natural vegetation, and a large amount of tabulated local data.

Studies in Guatemalan meteorology.—II, Weather types in southwest Guatemala, F. W. McBryde (*Amer. Met. Soc. Bul., 23 (1942), No. 10, pp. 400–406, illus. 2*).—Continuation of series (E. S. R., 88, p. 159).

Aspectos geográficos do Brasil (o clima, a terra e o homem) [Geographical aspects of Brazil (climate, land, and man)], S. Serebrenick (*Rio de Janeiro: Min. Agr., Serv. Inform. Agr., 1942, pp. 49+, illus. 13*).—Included are data on the temperature, humidity, winds, rainfall, and climatic types; geographical features, flora and fauna, and soils; and racial and sociological features.

Aplicación agrícola del estudio de las geo-temperaturas, J. Tiscornia (*Rev. Asoc. Ingen. Agrón. [Montevideo], 14 (1942), No. 4, pp. 37–46, illus. 6; Eng. abs., p. 46*).—The importance of studies of soil temperature and its influence on crop development is stressed, and, after summarizing the temperature behavior in different soils and according to depth, its influence on liquid absorption by roots is discussed. Graphic illustrations indicate some temperature variations in soils as affected by differing slopes.

Effect of climate on the yield and oil content of flaxseed and on the iodine number of linseed oil, A. C. Dillman and T. H. Hopper. (Coop N. Dak. Expt. Sta.). (*U. S. Dept. Agr., Tech. Bul. 844 (1943), pp. 69, illus. 11*) —The results of cooperative experiments over 1–10 seasons at 54 North American stations (Alaska to Mexico and Oregon to Nova Scotia) are reported. The flaxseed yields ranged from 1 to 20 bu. or more per acre under natural rainfall, and up to 40 bu. or more under irrigation. In the North Central States yields were positively correlated with crop-year precipitation and negatively with July temperatures. Deficient precipitation and high temperatures reduced the yield, seed size, and oil content and lowered the iodine number of the oil. In most cases highly significant correlations were found between acre yield, test weight, seed size, oil content, and iodine number. The correlation between seed size and oil content ranged from +0.64 to +0.85 in the several varieties. The percentages of fatty acids in the oils of four varieties (total of 40 crop seasons) are reported. Saturated acids ranged from 3.3 to 12.1, oleic acid from 9.4 to 37.3, linoleic acid from 2.3 to 39.6, and linolenic acid from 30.5 to 58.7 percent. The crude protein content of the meal was negatively correlated with precipitation and positively with July temperatures. The findings should aid planners of agricultural production during the war emergency in determining the better areas for flax. There are 22 references.

Relation of climatic conditions to color development in citrus fruit, C. R. Stearns, Jr., and G. T. Young. (Fla. Expt. Sta.). (*Citrus Indus., 24 (1943), No. 3, pp. 9, 12, illus. 2*).—Data presented indicate that during the fall and early winter months there is no definite color "break" in the orange varieties Hamlin, Parson Brown, and Pineapple until temperatures below 55° F. occur. The rapidity at which the hue approaches a maximum depends on the severity of the temperature drops and the continued occurrences of minimum temperatures below 55°. Color development in the grapefruit varieties March Seedless and Duncan appears to be gradual through fall and early winter. Minima below 55° are not stimulatory to color development in the grapefruit varieties analyzed.

Wind and trees, R. W. Richardson (*Assoc. Pacific Coast Geog. Yearbook, 7 (1941), pp. 41–47, illus. 6*).—Evidence presented from the central California coast and range area indicates that not only does most wind-shorn vegetation point the direction of prevailing winds, but it also provides useful knowledge in the fields of climatic microanalysis and microclimatic change.

The microbiology of the upper air, F. T. Wolf (*Bul. Torrey Bot. Club, 70 (1943), No. 1, pp. 1–14, illus. 2*).—Of the 20 species of bacteria in 7 genera identified from Petri dishes exposed over Nashville, Tenn., spore-forming rods and cocci were about equally abundant, with non-spore-forming rods in lesser concentrations. Of the 16 genera of fungi obtained, species of *Alternaria*, *Hormodendrum*, and *Fusarium* appeared to be most abundantly and consistently present. Quantitative data indicated an over-all average of 0.21 organism per cubic foot of air, subject to wide variation. Bacteria were the most abundant group of micro-organisms occurring in the upper air, composing 61.3–95.9 percent of the total. The proportion of fungi was 4.1–38.7 percent of the total number of micro-organisms. Yeasts and actinomycetes were present in small quantities. There are 29 references.

SOILS—FERTILIZERS

Soil-forming processes: Pedology in the service of soil science, J. S. Joffe. (N. J. Expt. Stas.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 68–77*).—The author presents pedology as the basis of soil science and suggests that it is to become the stepping stone in deciphering many soil problems confronting the scientific investigators and practical farmers engaged in the many branches of agriculture. Associating specific and puzzling soil questions with the soil-forming processes, one should be able to recognize the probable reactions of any particular method of managing the soil as a medium for plant growth, the ultimate aim of these studies. Concrete and specific examples are cited, showing how soil investigations of yesterday and even of today have not borne the desired fruit, or the results have been meager because of the detached position of these investigations from the fundamentals of pedology. These fundamentals point to each zonal soil possessing a physicochemical system of its own. Hence, the experimental procedure should differ and the results of the experiments be interpreted accordingly.

Advantages and problems related to the field study of soil development, G. D. Smith. (Ill. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 78–82, illus. 3*).—The contribution of the field worker to the knowledge of soil formation is discussed. The laboratory worker is able to determine what changes have taken place in given profiles where the parent material is known, but he is often unable to determine the roles of the various soil-forming factors. The field worker is able to obtain qualitative information on a great many profiles and is able to locate and study a series of profiles in which a number of the soil-forming factors can be at least partially controlled, also he can develop qualitative ideas concerning the relative influence of the variations in soil-forming factors. Data are presented to illustrate the interdependence of the field and laboratory study of soil development.

Soil genesis from fragmental volcanic rocks in the Lesser Antilles, F. Hardy and G. Rodrigues (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 47–51, illus. 1*).—The relationships between eight soil types derived from the various fragmental volcanic rocks of the Lesser Antilles, which belong to one petrological province, are presented to bring out the effect of age, rainfall, topography, and porosity as factors in soil genesis and pedological evolution.

The influence of environment on soil formation, J. Thorp. (U. S. D. A.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 39–46*).—Differences in soils, corresponding to differences in geographic environment, are grouped in three orders.

Soil differences of the first order are broad and zonal in character, and they correspond to differences in climate and organic life. The deserts, grasslands, forests, and tundras provide the geographic backgrounds for the zonal and associated intrazonal and azonal soils.

Soil differences of the second order are local in character and correspond to local differences and variations in four factors of the environment—parent rock, relief, age of the soil, and biological activity. Variations in parent rock under various drainage conditions result in the formation of soils that generally can be grouped in catenas, families, or complexes. Gradational variations from one rock to another lead to sequences of soil types if drainage conditions are uniform, or to sequences of catenas if drainage conditions are variable. Relief as a geographic factor in soil formation owes its importance to its effect on (1) the accumulation of soil moisture, (2) the rate of geologic and accelerated erosion and deposition, and (3) the use of the soil by man and his influence on soil formation. The effects of time on soil formation are conditioned by climate and the kind of parent rock. The physiographic and the geologic status of the landscape usually gives the best clue to the age of a soil, the oldest soils in terms of years occurring on ancient undissected peneplains. Most of the truly old soils of the world are intrazonal in character for this reason.

Soil differences of the third order are those that owe their existence to man's activities. By his methods of cultivation man has converted zonal soils into intrazonal and azonal soils, and has initiated the transformation of intrazonal soils to zonal soils by the use of artificial drainage. He is responsible for the destruction of both infertile and fertile soils, and also can claim credit for the enrichment of soils that would otherwise be infertile and unproductive.

Preliminary investigations of heavy mineral criteria as an aid in the identification of certain soils in Oklahoma, W. H. Buckhannan and W. E. Ham. (U. S. D. A. et al.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 63–67, illus. 1*).—Preliminary comparisons of heavy minerals in Permian "Red Beds" with those in recent sediments and old terrace materials of the Canadian and other rivers in central Oklahoma revealed striking differences. The hypothesis is advanced that these differences may contribute to a fundamental knowledge of soil parent materials and soil morphology by aiding the identification of soil series. Examination of numerous samples from key areas supports the hypothesis.

Soil survey of Sumter County, South Carolina, R. T. A. Burke et al. (Coop. S. C. Expt. Sta.). (*U. S. Dept. Agr., Bur. Plant Indus. [Soil Survey Rpt.], Ser. 1935, No. 24, pp. 61, illus. 2*).

Physical land conditions on the Farmersburg-McGregor project, Clayton County, Iowa, D. E. Perfect and D. A. Sheetz (*U. S. Dept. Agr., Soil Conserv. Serv., Phys. Land Survey No. 28 (1942), pp. 25+, illus. 11*).

A soil penetrometer, S. J. Richards. (N. J. Expt. Stas. and U. S. D. A.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 104–107, illus. 3*).—A soil penetrometer is defined as a machine which measures the force required to push a probe-rod into the soil. The machine designed and constructed was built mainly of standard pipe fittings without the use of machine tools and records automatically the force at every depth of penetration. The machine was designed for field use and is powered manually. Data are presented to show the seasonal variations in the forces measured by the penetrometer for Collington sandy loam soil.

A soil tube for obtaining wet clay cores in an undisturbed structural condition, A. J. Stewart. (U. S. D. A.). (*Soil Sci., 55 (1943), No. 3, pp. 247–251, illus. 5*).—The author describes a new soil tube for obtaining structurally undisturbed cores from a wet clay soil. The cutting head is made of copper, long and slender, with fins to eliminate suction when the tube is being withdrawn from the soil, and has a surface lubricated by a coating of mercury. Because of the softness of the metal in the cutting head, the tube is limited to use in a wet soil devoid of gravel and large woody roots.

A method for measuring the plant residue fragments of the soil, T. M. McCalla, F. L. Duley, and T. H. Goodding. (U. S. D. A. and Nebr. Expt. Sta.). (*Soil Sci., 55 (1943), No. 2, pp. 159–166, illus. 2*).—The plant residues were separated from the soil in three fractions—(1) the plant material greater than 3 mm. This was separated by passing the dry soil through a screen. (2) The material less than 3 mm. but greater than 0.4 mm. This fraction was obtained by wet-screening of the dispersed soil. (3) Material less than 0.4 mm. but retaining its cellular structure, a fraction which was determined by flotation in a tall glass tube to the walls of which the particles adhered as the liquid was lowered slowly. Each fraction was dried at 105° C. and weighed. Data to show the reliability of the method are presented.

Soil-volume changes and accompanying moisture and pore-space relationships, C. W. Lauritzen and A. J. Stewart. (U. S. D. A.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 113–116, illus. 3*).—A method for measuring the shrinkage of soil is described. The character of shrinkage which accompanies the drying of soil in its field structural condition as it is related to clods of different densities representing structural different depths of one soil type and clods of two dissimilar soil types is given, and a theory to account for the character of the shrink age is presented. Shrinkage measurements are suggested as useful for obtaining an index of clay properties, structural conditions, and available water.

Pore-size distribution as a measure of soil structure, M. B. Russell. (Iowa Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 108–112, illus. 4*).—This article presents a technic whereby moisture desorption curves, which provide a simple method for measuring size distribution of soil pores, can be quickly and easily obtained. The author points out that while the characterization of soil porosity from desorption curves shows considerable promise to develop into a useful method for attacking problems of soil structure, care must be used in interpretation of the curves and particular attention paid to adequate sampling.

A note on electrical methods of determining soil moisture, E. C. Childs (*Soil Sci., 55 (1943), No. 3, pp. 219–223, illus. 1*).—The author points out sources of unreliability in measurements of capacitance of soil condensers as an indication of moisture content, and demonstrates by deriving the relationships of essentially involved values through the method of complex quantities, by experiment, and by examination of the results of Anderson and Edlefsen (E. S. R., 88, p. 162), the profound effects of poor electrode contact when the dielectric is very leaky.

Since the variation of capacitance of a soil condenser with moisture content appears to be really but an indirect consequence of variation of resistance and is greatly dependent on contact conditions largely out of the control of the experimenter, it would seem preferable to measure the resistance directly, this being relatively insensitive to sheath formation. If there should be any advantage in measuring capacitance, there would appear to be possibilities in the application of the alternating current potentiometer in conjunction with four-electrode cells, since no current is taken from the potential electrodes at the balance point and therefore sheath formation is quite without effect. The apparatus is, however, bulky, and it would not be an easy matter to design it as a portable field set. The alternative is to work at very high frequencies.

Variations in the silt and clay fractions of loessial soils caused by climatic differences, H. B. Vanderford. (Mo. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 83–85, illus. 2*).—A study of the silt and clay fractions of some loessial soils collected along the bluffs of the Missouri and Mississippi Rivers to determine the effect of climatic variations revealed the following: (1) The quartz content of the silt fraction increased with rainfall because the less-resistant, other-than-quartz minerals decreased; (2) the calcium content of the silt decreased as the quartz content increased; (3) the base exchange capacity of the clay separate decreased with increasing rainfall, was independent of particle size, and indicated a change in the chemical composition of the clay corresponding to differences in climatic conditions under which the clay developed; and (4) the $SiO_2:R_2O_3$ ratio decreased in the same manner as the exchange capacity of the clay.

Structural stability and permeability of native forest soils compared with cultivated areas of the same soil type, R. B. Alderfer and F. G. Merkle. (U. S. D. A. and Pa. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 98–103*).—Soil structural conditions for areas which had been used in different cropping systems for many years were compared with the same soil type found in native forest land which had never been plowed. The soils from the forest areas were found to be the most permeable and had the highest stability index. Areas in permanent sod and in rotations including considerable sod crops were in fair structure but not equal to the forest sites. Soils used intensively for vegetable gardening, cultivated orchards, and nurseries showed marked structural deterioration. Organic matter was found to be associated with structural stability.

The use of micro-aggregation or dispersion measurements for following changes in soil structure, L. Kolodny and O. R. Neal. (N. J. Expt. Stas. and U. S. D. A.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 91–95*).—Microaggregation or dispersion measurements were found to be a convenient and relatively accurate method for following changes in soil structure. By far the most important variable was found to be the moisture content. The degree of microaggregation seems to vary with the moisture content, the method of wetting, and the history of wetting. Organic matter is another important variable. Although there is no noticeable correlation between total organic matter and microaggregation, a definite increase in microaggregation was indicated in plats that had been treated a few years with cover crop and manure. The time of sampling is also a variable. Seasonal changes show the dynamic character of soil structure and are probably primarily a function of changes in the moisture regime of the soil.

Soil development and plant nutrition.—I, Nutrient delivery to plants by the sand and silt separates, E. R. Graham. (Mo. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 259–262, illus. 2*).—Nutrient delivery by sand and silt separates by using their minerals as the sole source of nutrients was determined by growth of soybean plants. Samples investigated were obtained from North Dakota, Iowa, Missouri, Mississippi, southern Illinois, Kansas, and Utah. Sufficient quantities of nutrients were delivered from sands and silts of the Iowa and Utah samples to produce excellent growth. Medium growth was obtained on the sands and silts of the Kansas and North Dakota samples. The nutrient delivery from the Mississippi, Missouri, and southern Illinois samples was so small that crop failures were recorded.

Surface relationships of roots and colloidal clay in plant nutrition, W. A. Albrecht, E. R. Graham, and H. R. Shepard. (Mo. Expt. Sta.). (*Amer. Jour. Bot., 29 (1942), No. 3, pp. 210–213*).—From root surface per unit volume of soil and the surface areas of colloidal clays the quantity of calcium delivered to the crop through exchange phenomena was calculated. The results suggested that a crop gets more calcium than is present on only that clay surface in immediate root contact. The data suggested that exchangeable ions move from one clay particle to the next clay particle through several such layers. Hydrogen movement from hydrogen clay into calcium clay and the reverse movement of calcium were demonstrated. Hydrogen clay contact with mineral crystals demonstrated similar exchange from the crystal to the clay colloid. Ionic movement from the mineral crystal to the root by direct contact failed to nourish the plants fully. The crystal in contact with the clay served effectively, however.

The importance of agitation of the soil suspension with the glass electrode, E. H. Bailey. (U. S. D. A.). (*Soil Sci., 55 (1943), No. 2, pp. 143–146*).—Comparing the results obtained by the bubbling hydrogen electrode method and by the glass electrode with and without compressed air agitation, the author finds that agitation of the soil suspension with glass electrode is essential for reliable results, especially with coarse-textured soils, the particles of which settle out quickly. The tendency is to obtain the pH of the soil extract rather than that of the soil suspension when agitation is not employed. The heavy soils, high in colloidal content, tend to show less differences between agitation and nonagitation, because colloids stay in suspension for a relatively long time. There are too many exceptions to this rule, however, to warrant nonagitation of heavy soils. The purpose of agitation is to bring the nonsuspended soil particles, as well as the suspended and soluble portions of the soil, into direct contact with the electrode so as to obtain the true H-ion concentration of the soil as a whole.

The swelling of quartz sand, soil colloid, and organic colloid, H. E. Myers and F. W. Smith. (Kans. Expt. Sta.). (*Soil Sci., 55 (1943), No. 3, pp. 253–255*).—The substances reported upon consisted of finely ground (140-mesh) quartz sand; a soil colloid isolated from the B horizon of Crete silt loam, electrodialyzed, dried, and crushed to pass a 100-mesh sieve; and an organic colloid, prepared from partly decomposed alfalfa hay. The percentages of swelling observed were quartz sand, untreated, 3.8; quartz sand exposed to toluene 20 min., 14.6; soil colloid, untreated, 55.9; soil colloid, toluene 20 min., 81.8; alfalfa colloid, untreated, 10.8; and alfalfa colloid, toluene 20 min., 4.0.

Freezing points of a group of California soils and their extracted clays, G. B. Bodman and P. R. Day. (Calif. Expt. Sta.). (*Soil Sci., 55 (1943), No. 3, pp. 225–246, illus. 6*).—The influences upon the freezing-point depression of soils exerted by moisture content, texture, dissolved solutes, constituent clays, and mechanical alteration of structure were studied, and the corresponding moisture potentials were calculated by means of the freezing-point equation.

The moisture potential at the moisture equivalent was found to be influenced principally by the osmotic effects of dissolved solutes in the soils investigated, the pressure potential making a relatively small contribution to the moisture potential at this soil-moisture content. At the permanent wilting percentage, wide variations in the moisture potential between soils were found. The evidence of this paper suggests that the energy of retention at the permanent wilting percentage appeared to be of the order of magnitude of -18×10^6 e. per gram, corresponding to an equivalent pressure of about 18 atmospheres. Drastic mechanical treatment had only a slight influence on the energy curves, an effect attributed to a high degree of stability of the microstructure. This effect was especially marked in the kaolinitic Aiken soil. Irrespective of the cause, puddling had a rather small effect on the energy curves, and abnormal moisture deficiencies of plants growing in puddled soils should be attributed to factors other than the intensity of water retention. The clay content of the soils affected the moisture content corresponding to a given moisture potential, an effect which became progressively less as the energy level diminished. It appeared that the higher concentrations of the soil solution, necessarily associated with the lower soil moisture contents, are not responsible in themselves, through their osmotic potentials, for masking the effect of the clay. The various soil clays displayed widely differing moisture potential curves. The curves for the clays lay between those for the natural soils on the one hand and those for bentonite and kaolinite on the other. Kaolinitic types tended to behave as though coarser-grained, though there was no clear-cut relationship between the position of the energy curve and the type of predominating clay mineral present. Genetically related soils usually showed similar energy curves.

Electron micrographs of clay minerals, B. T. Shaw and R. P. Humbert. (Ohio Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 146–149, illus. 2*).—Electron micrographs of montmorillonite, nontronite, illite, beidellite, kaolinite, halloysite, dickite, and Cecil clay are presented. The montmorillonites examined show structures ranging from a fluffy, amorphous-appearing material to well-defined, extremely thin plates. Nontronite is characterized by flat, frayed fibers. Kaolinite and dickite both have hexagonal plate-shaped crystals. Dickite crystals are much thicker than most kaolinite crystals. Halloysite is characterized by long split rods. The authors suggest that the pictures presented indicate the possibility of using electron micrographs to aid in the identification of the minerals present in extracted colloids.

Clay minerals of the montmorillonite group: Their mineral and chemical relationships and the factors controlling base exchange, C. S. Ross and S. B. Hendricks. (U. S. D. A. et al.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp.*

58–62).—The montmorillonite group of clay minerals, including beidellite, nontronite, and saponite, is characterized by members of widely varying chemical composition, but with certain essential properties in common, including base exchange. A comprehensive understanding of the group has involved detailed studies of the purity of various samples, their chemical composition, base exchange capacity, optical properties, and the various roles of an almost uniquely large group of ions within the crystal lattice, as revealed by X-ray studies. Analyses of 100 mineral specimens of the montmorillonite group have enabled the workers to give formulas for montmorillonite, beidellite, a clay from Hector, Calif., saponite, nontronite, and aluminian nontronite.

X-ray diffraction procedure for positive differentiation of montmorillonite from hydrous mica, M. L. Jackson and N. N. Hellman. (Wis. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 133–145, illus. 22*).—Diffraction patterns were made according to a proposed procedure for X-ray diffraction analyses, using 27 soils and 18 bentonites and other clays representing several localities to determine the effect of various treatments on the diffraction line. The type of base saturation of montmorillonite and method of obtaining the saturation, and also the kind of medium from which the saturated material is dried, were found to control the interplanar spacing to a greater extent than has been generally recognized. The effects of various other chemical and physical treatments on the diffraction pattern of different clays are presented in detail.

Effect of type of clay mineral on the uptake of zinc and potassium by barley roots, M. M. Elgabaly, H. Jenny, and R. Overstreet. (Univ. Calif.). (*Soil Sci., 55 (1943), No. 3, pp. 257–263, illus. 2*).—Zinc and potassium ions absorbed on clay particles were found to be readily utilized by excised barley roots. Under comparable experimental conditions the roots generally removed more cations from bentonite sols than from kaolinite sols, especially at low concentrations of cations. At higher concentrations no difference was found. The same behavior was observed in suspensions of Yolo silt loam and Aiken clay. The former contains montmorillonitic, the latter kaolinitic clay.

It is noted that these findings cannot be explained by the current CO_2 theory and soil solution concepts in that hydrolysis, carbonic acid, and $NaNO_3$ bring about a greater release of cations from kaolinite than from bentonite. Some additional factor, not yet fully evaluated but associated with the nature of the colloidal clay, comes into play.

Occurrence of gibbsite in some soil-forming materials, L. T. Alexander, S. B. Hendricks, and G. T. Faust. (U. S. D. A.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 52–57, illus. 1*).—Gibbsite was found in a number of soils and soil colloids from the United States. Primary weathering products of norites, amphibolites, an epidote greenstone schist, a diabase, and muscovite-biotite schists were shown to contain gibbsite.

The effect of carbon dioxide on soil reaction, R. S. Whitney and R. Gardner. (Colo. State Col.). (*Soil Sci., 55 (1943), No. 2, pp. 127–141, illus. 4*).—It is shown that small changes in CO_2 pressure cause comparatively large changes in pH within the range of low CO_2 pressures comparable to those normally found in the soil, that the pH is approximately a straight-line function of the logarithm of the CO_2 pressure in the pressure range from about 0.0003 to 1 atmosphere of CO_2 at constant moisture, and that at constant CO_2 pressure the pH of soil suspensions tends to drop slightly with dilution. The rise in pH of soils frequently observed with increasing water content appeared probably to be due primarily to dilution of the CO_2 absorbed in the soil sample. The curves showing the effect of variations in CO_2 pressure on pH of the soils studied were similar in shape to curves for $CaCO_3$, but were affected by dilution more than were the curves for calcium or magnesium carbonate. Curve positions on the pH scale were shown to be changed appreciably by the presence of calcium, magnesium, or sodium carbonates.

It is concluded that expressing the pH of soils as variable functions of CO_2 pressure would give a better indication of the probable pH range in the field in the presence of plant roots and decaying organic matter than could be obtained from single pH measurements. The pH being apparently a straight-line function of the logarithm of the CO_2 pressure, two points would be sufficient to determine a curve at constant moisture. Whether single determinations or curves are to be used in expressing pH values, it appears necessary to make measurements under equilibrium conditions with controlled CO_2 pressure if the results are to be reproducible. Controlling CO_2 pressure by using distilled water treated to remove CO_2 in making pH determinations has the disadvantage of producing a CO_2 pressure lower than would likely be found in the field and, therefore, giving pH values higher than the maximum under field conditions.

Base unsaturation and pH in relation to soil type, A. Mehlich. (N. C. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 150–156, illus. 4*).—Several profiles of different soil types and various base exchange colloids were investigated to determine percentage of base unsaturation over a wide range of soil reaction. The base unsaturation-pH relationship of several soils was found to be similar to the principal characteristics of the known base exchange materials. The author points out that this relationship is important as an aid in classification and determination of the lime requirement of soil.

Permeability of soil, W. Gardner. (Utah Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 126–128, illus. 1*).—A technical consideration of the basic equations of hydrodynamics in relation to soil physics problems.

Rate of application of organic matter in relation to soil aggregation, G. M. Browning and F. M. Milam. (W. Va. Expt. Sta. and U. S. D. A.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 96–97, illus. 2*).—Alfalfa, rye and vetch, sucrose, and wheat straw were applied at the rate of 1, 2, 4, 6, and 8 tons per acre to a Gilpin silty clay loam soil. After incubation for 30 days at optimum moisture conditions, aggregate analyses were made, using the wet sieving procedure. There was a significant increase in aggregation for each unit increase in organic matter for all materials studied. Sucrose is much more effective than the other organic materials in the formation of aggregates. Larger-sized aggregates are formed from sucrose than from the other materials.

The role of bluegrass in the conservation of the soil and its fertility, D. M. Whitt. (Mo. Expt. Sta. and U. S. D. A.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 309–311, illus. 1*).—Changes in nitrogen, organic matter, and exchangeable calcium are reported for Shelby soil as affected by 8 yr. of bluegrass sod. Organic matter and nitrogen showed a fairly constant increase, while exchangeable calcium showed an irregular increase. The author points out that the use of bluegrass as a pasture-meadow rotation crop can have a direct effect on soil fertility, while at the same time its value in conserving soil and water is not decreased.

Biological assays of soil fertility, W. A. Albrecht and G. E. Smith. (Mo. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 252–258*).—The authors point out that the generally accepted standard of determining the value of a certain soil management practice through increased yields alone may frequently give an incorrect picture because of differences in chemical composition of the crop produced. For example, when both lime and phosphate were used the yields were from 20 to 26 percent higher than where phosphate was used alone. When the same hays were fed to experimental animals the difference in amount of meat produced was from 60 to 80 percent more. From comparative studies with sheep and rabbits, the workers found the small rabbits gave results close to those obtained with the larger animals and suggest that the expense of conducting trials with larger animals may thus be eliminated. While the article deals only with the effect of calcium treatment on the soil, the authors conclude that the proposed method of animal assay should be of value in measuring the effec. of other soil treatments.

The activity of the microflora in various horizons of several soil types, A. S. NEWMAN and A. G. NORMAN. (Iowa Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 187–194, illus. 5*).—A CO_2-rate procedure was developed for the comparative evaluation of soil populations which takes into account not only the cumulative CO_2 evolution but also the time elapsing before the peak rate is attained. In general, the peak rate was attained more and more slowly with increasing depth in the profile, even when available organic matter in the form of cornstalks was added. This indicates a progressive reduction in the size of the population. The proposed procedure was employed in a detailed study of soil profiles, two being Prairie soils, two Gray-Brown Podzolic, and one Planosol. Marked differences were found between the potentialities of the populations of the different horizons in these soils.

Effect on runoff and erosion of improved aggregation resulting from the stimulation of microbial activity, T. C. PEELE and O. W. BEALE. (U. S. D. A. coop. S. C. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 176–182, illus. 2*).—The addition of sucrose to field areas of Cecil sandy loam caused increases in microbial activity, soil aggregation, percolation rates, volume of large pores, and infiltration rates. It caused decreases in runoff and erosion, although in several cases the decreases were small, and in such instances they probably were not significant. Bacterial numbers increased rapidly following the sucrose treatments. The fungal counts remained at a much higher level in the sucrose-treated than in the untreated soil for several months following the treatments. The percentage of large water-stable aggregates increased rapidly following the sucrose treatments and coincided approximately with the large increase in numbers of bacteria, although the improved aggregation persisted long after the bacterial population declined. The authors conclude that the improved aggregation was due primarily to the cementing action of bacterial mucus and the mycelium of fungi, although other products resulting from the stimulated microbial activity may have also served as binding agents.

Isolation and identification of rhizobia bacteriophage, W. H. FULLER and S. C. VANDECAVEYE. (Wash. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 197–199, illus. 2*).—A detailed report of procedure for the isolation and identification of bacteriophage of *Rhizobium*.

Why does H^+ become toxic to soil bacteria? T. M. McCALLA. (Kans. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 165–167*).—Washed bacterial cells placed in the presence of ions were shown to bind these ions immediately upon contact. H^+ toxicity in an acid soil was explained on the basis that under this condition there would be an abundant supply of H^+ and a low supply of Ca^{++}, resulting in a taking up by the cell of H^+ because of its higher adsorbability position to the exclusion of nutritive ions.

Measurement of wind erosiveness of soils by dry sieving procedure, W. S. CHEPIL (*Sci. Agr., 23 (1942), No. 3, pp. 154–160, illus. 1*).—A method for determining the approximate wind erosiveness of freshly cultivated soils, based on wind tunnel experiments (E. S. R., 85, p. 590) showing the relation between erosiveness and dry aggregate structure as determined by dry sieving procedure, is described.

Plant nutrient losses by erosion from a corn, wheat, clover rotation on Dunmore silt loam, H. T. ROGERS. (Va. Expt. Sta. and U. S. D. A.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 263–271, illus. 4*).—Material eroded from Dunmore silt loam cropped to corn on slopes of from 5 to 25 percent was 16 and 11 percent higher in total nitrogen and phosphorus than the original soil. The average loss of the soil's supply of total N, P_2O_5, K_2O, CaO, and MgO in the A_p horizon by erosion during a 3-yr. rotation of corn, wheat, and clover was only about 1.5 percent. The rate of depletion of the soil's supply of the several nutrient elements was more nearly a linear function of slope than were losses of total nutrients or soil.

The movement and evaporation of soil water in relation to pF, C. M. WOODRUFF. (Mo. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 120–125, illus. 5*).—Moisture movement phenomena were studied in short columns of soil when drying in air. Evaporation curves reveal a limited moisture content where soil moisture movement as the liquid phase does not take place. Water movement takes place only through the vapor phase when soil moisture is below the limiting content, and thus is lost at a slower rate than when movement through the liquid phase occurs. Movement of water through the soil in the liquid phase ceases when the surface of a short column of soil becomes dry. Water loss may then occur only by evaporation beneath the surface, and the rate of evaporation is related inversely to the square of the thickness of the dry layer of soil through which the vapor diffuses. Practically, this means that it will require four times as long to dry out the second inch of soil as it does to dry out the first inch. The limiting moisture content corresponds to the field capacity. It may occur at any moisture potential. In coarse-textured soils and in very fine-textured structureless soils it corresponds to the moisture potential required to empty the pores. This moisture potential is a function of the size of the dominant group of pores. In soils of medium texture, such as in fine sandy loams, in silt loams, and in granulated clay loams, the limiting moisture content is determined by the instability of water in the liquid phase at a moisture potential of pF 3. Consequently, most agricultural soils which fall in this range of textures exhibit a moisture potential of pF 3 at field capacity.

Model tests of flow into drains, S. W. HARDING and J. K. WOOD. (Utah Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 117–119, illus. 3*).—A continuation of studies previously reported by Kirkham (E. S. R., 87, p. 634), involving use of models to study flow into drains. Various cases of practical and theoretical interest are presented.

Drainage water losses from a sandy soil as affected by cropping and cover crops, Windsor lysimeter series C, M. F. MORGAN, H. G. M. JACOBSON, and S. B. LECOMPTE, JR. (*Connecticut [New Haven] Sta. Bul. 466 (1942), pp. 727–759, illus. 2*).—Crop removal and leaching as affected by nitrogen fertilization and cover cropping were investigated with lysimeters, with special reference to the Connecticut Valley tobacco crop. Nitrogen and organic matter changes in the soil were determined under controlled conditions. Detailed plans of the experiment and discussion of weather conditions are presented for the 10-yr. period ended in the spring of 1941.

The largest amounts of drainage water were collected from fallow soils. The percolation of water through the soil under grass sod was similar to that under tobacco cropping, followed by oats as a cover crop. Oats was somewhat more effective than rye or timothy in reducing the amount of leaching. The effects of cropping were greatest during the late summer and early fall and winter. In late spring and early summer, leaching was somewhat greater from the cover-cropped soils. Nitrogen losses from the soil were greatest under uncropped conditions. Cover cropping with nitrogen treatment was especially effective in maintaining soil nitrogen. Rye was the most effective of the cover crops. Under grass sod very little nitrogen was carried from the soil by leaching, even when liberally fertilized. Soil under permanent grass without nitrogen became depleted. With Calurea treatment there was a net gain. Organic matter losses during the 10-yr. period were considerable from the fallow soils, representing a depletion of from 15 to 18 percent of the initial amount. Cropping retarded organic matter losses, even without organic fertilizer or cover crop. Cover cropping produced net gains in soil organic matter. Rye contributed the greatest gains in organic matter to the surface soil. Grass sod without nitrogen caused soil depletion; when fully fertilized an organic gain was obtained.

Crop yields were materially diminished when nitrogen was omitted from the treatment. Calurea supported somewhat larger crops of greater nitrogen content than when 80 percent of the nitrogen was supplied as vegetable organics. Cover crops caused insignificant increases in tobacco yields and slightly favored total nitrogen utilization by the crop. A study of drainage water losses in relation to crop removals indicated that the chief effects of cover crops in conserving various chemical soil constituents are associated with decreased leaching of nitrates. Comparisons of drainage water losses, crop removals, and amounts added to the soil during the 10-yr. period indicated gains of the various constituents, with the exception of nitrogen and calcium. Gains in sodium, sulfur, and chlorine were of small magnitude in relation to the amounts applied. Crop removals accounted for the small proportions of phosphorus in the treatments. This element did not leach.

From base exchange studies, which were found to be in close relationship to leaching and crop-removal measurements, the authors point out that the amounts of exchangeable bases in the soils of the Connecticut Valley represent the working balance of calcium, magnesium, potassium, and sodium as regulated by amounts added to the soil and removed by crops and drainage water.

Water control in the peat and muck soils of the Florida Everglades, B. S. Clayton, J. R. Neller, and R. V. Allison. (Coop. U. S. D. A.). (*Florida Sta. Bul. 378 (1942), pp. 74, illus. 15*).—The authors state that an outstanding need of the Everglades is a comprehensive plan of water conservation whereby the water now wasted could be used to maintain a higher water table in the idle lands and thus decrease the losses from subsidence and fires. This should also provide for a definite system of outlet canals for all lands of agricultural valve so that an orderly development could be achieved. Under present conditions expansion is taking place without plan. The soils consist mostly of saw grass peat, together with Okeechobee or plastic muck and Okeelanta peaty muck (willow and elder) land. Subsidence has been aproximately 5 ft. since drainage. The present rate of loss is approximately 1 in. per year. Pumps are essential for the proper control of water in the northern Everglades. Most of the subdistricts are served by large pumps of the Wood-screw type with a capacity of approximately 1 in. over the area served. A pumping capacity of from 2 to 3 in. is recommended for areas of moderate size used to grow truck crops. Collection ditches should have a total capacity equal to that of the pumping plant and should be kept clean of hyacinths, moss, and grasses, which greatly reduce the channel capacity. Mole lines, usually spaced from 12 to 15 ft. apart and 30 in. deep, provide an inexpensive subdrainage system and increase the rate of drop of the water table after heavy rains.

Following the contour (how to strip-crop Iowa land), J. B. Peterson and L. E. Clapp (*Iowa Sta. Bul. P53 (1943), pp. 729–748, illus. 16*).—This popular publication points out the soil conservation values of contour farming and presents through discussion and illustration the steps involved in establishing various systems of contour farming.

The salt index—a measure of the effect of fertilizers on the concentration of the soil solution, L. F. Rader, Jr., L. M. White, and C. W. Whittaker. (U. S. D. A.). (*Soil Sci., 55 (1943), No. 3, pp. 201–218*).—The authors report upon a study of the effect of fertilizer materials and mixed fertilizers on the concentration of the soil solutions of several soils. The solutions were obtained from soils containing water corresponding to 75 percent of the moisture equivalent, and their concentrations were expressed in terms of osmotic pressure. The widely varying osmotic effects of individual materials on the soil solution and the lack of correlation between these effects and those found in water solutions in the absence of soil are pointed out, this difference being especially noticeable with respect to the phosphates.

A new quantity, the salt index of fertilizers, is proposed as a means of expressing differences in the probable effects of different fertilizers or fertilizer constituents upon the soil solution and consequently upon the tendency of the fertilizer to injure crops by undue osmotic pressure in the soil solution. This index may be calculated for any mixed fertilizer of known composition and may be expressed by the equation salt index$=\frac{100p}{p'}$, in which p=increase in osmotic pressure of the soil solution due to application of a definite weight of a fertilizer mixture or fertilizer material and p'=increase due to application of the same weight of sodium nitrate under identical conditions.

A comparison of the effect of fertilizer and manure, organic matter, and carbon-nitrogen ratio on water-stable soil aggregates, J. Elson. (U. S. D. A. coop. Va. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 86–90*).—Continuing an investigation previously reported upon (E. S. R., 85, p. 448; 86, p. 447), soil samples from plats of a long-time fertility experiment on Dunmore silt loam were studied to find the relationship between soil aggregation and agronomic treatments. Water-stable soil aggregates were determined by wet screening the soil at field moisture. Results are reported on soil aggregates larger than 1 mm., soil moisture, organic carbon, nitrogen and carbon: nitrogen ratio, and organic matter in the total soil under different soil management practices.

Influence of cropping, manure, and manure plus lime on exchange capacity, exchangeable calcium, pH, oxidizable material, and nitrogen of a fine-textured soil in eastern Nebraska, G. R. Muhr, H. W. Smith, and M. D. Weldon. (Nebr. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 2, pp. 107–113*).—Sixteen yr. of cropping resulted in small but not significant decreases in exchange capacity and content of exchangeable calcium in the surface soil. A significant decrease was found in pH value, amount of oxidizable material, and nitrogen content. Applications of manure did not produce a statistically significant effect on exchange capacity and content of exchangeable bases over check plats. The content of nitrogen and oxidizable material under manure treatment differed significantly from the check plats. Applications of manure and lime resulted in highly significant differences in exchangeable calcium and pH.

Exchangeable cation status and structure of Palouse silty clay loam as influenced by various cropping and fertility practices, L. Zobler and L. T. Kardos. (Wash. Expt. Sta.). (*Soil Sci., 55 (1943), No. 2, pp. 147–158, illus. 3*).—Structure was evaluated by measuring the water stability of the aggregates, a wet-sieving procedure being used for the macroaggregates and the Bouyoucos (E. S. R., 74, p. 598) hydrometer for the microaggregates.

Plats cropped annually to wheat were found to possess a less stable macrostructure than those alternately cropped and fallowed. The microstructure of the annually cropped plats, however, appeared to be more stable as a result of the presence of more organic colloid. Additions of straw and manure resulted in greatest macrostability, alfalfa hay and straw supplemented with nitrogen in less, and the check plats and the plats receiving sodium nitrate alone had the least. Microstructure was adversely affected when the nitrogen was supplied as sodium nitrate or ammonium sulfate.

Available nutrients in fertilized soils at various periods of the year, J. F. Reed. (La. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 246–251, illus. 2*).—Data on variations in available phosphorus, water-soluble phosphorus, 0.05 N HCl-soluble potassium, and adsorbed phosphorus and potassium at various times during the year are presented for nine Louisiana soils devoted to strawberry production.

Leaf analysis as a means of determining the fertilizer requirement of crops, W. Thomas, W. B. Mack, and R. H. Cotton. (Pa. Expt. Sta.). (*Amer. Fert., 98 (1943), No. 4, pp. 5–7, 26, 28, illus. 1*).—A method of leaf analysis designed to provide information on the balance of fertilizer elements is outlined in detail. Factors to be considered in the time of taking samples and the number of samples to be taken are discussed. The authors emphasize the possibilities of leaf analysis as a quick method for obtaining needed information on the condition of crop nutrition.

Laboratory data as an aid in interpreting the results of cotton and corn fertilizer experiments in Georgia, L. C. Olson. (Ga. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 238–242, illus. 2*).—Laboratory studies were carried on of soil reaction, clay content, available potassium, base-exchange capacity, and exchangeable bases. The available potash in the soil prior to application of fertilizer was found to give a reliable index of the needs of the cotton plant for potash. The response from liming for cotton was found to be related to the amount of available potash in the soil.

Fertilizers needed by peanuts differ with soil fertility, R. Coleman (*Miss. Farm Res. [Mississippi Sta.], 6 (1943), No. 3, pp. 1, 8*).—A popular presentation of peanut fertilization under various soil types and fertility conditions.

Phosphated vetch and nitrogen for banner corn yield, J. L. Anthony (*Miss. Farm Res. [Mississippi Sta.], 6 (1943), No. 3, pp. 7, 8*).—The beneficial response of vetch and the corn crop following the fertilization of the vetch with phosphorus or combinations of phosphorus and lime, or phosphorus, lime, and potash, are considered in relation to supplying the corn crop with legume nitrogen.

The mineralization of the organic phosphorus of various compounds in soil, R. W. Pearson, A. G. Norman, and C. Ho. (Iowa Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 168–175*).—An investigation into the mineralization of organic phosphorus contained in plant residues and of the effect of lime on mineralization, as well as the mineralization of organic phosphorus from nucleic acid, its component nucleotides, and from samples of microbial tissues, to obtain information on the extent of immobilization accompanying the decomposition of nucleic acid. The rate of decomposition of nucleic acid was rapid, while that of phytin was slow. Adding lime brought about an increase in the amounts of dilute acid-soluble inorganic phosphorus and also accelerated the mineralization of phytin. Complete mineralization of nucleic acid did not take place, and the nucleotide preparations behaved similarly to nucleic acid.

Phosphate fixation—an exchange of phosphate and hydroxyl ions, J. B. Kelly and A. R. Midgley. (Vt. Expt. Sta.). (*Soil Sci., 55 (1943), No. 2, pp. 167–176, illus. 1*).—The authors point out that most soils, especially the lateritic and podzolic soils (B horizon), contain much iron oxide distributed as a film over individual soil particles. Though this hydrated iron oxide is not in solution, its colloidal nature and its surface position on soil particles make it very active in fixing any soluble phosphate that comes in contact with it. Data here presented indicate that phosphate fixation is a physicochemical exchange of phosphate ions for these exposed hydroxyl ions. Though this seems to be an equilibrium reaction, in soils it is greatly shifted toward phosphate fixation by the very low hydroxyl-ion concentration in the soil solution and the high hydroxyl concentration of the hydrated ferric oxides on the surface of the soil particles. Kaolin fixes phosphate only when it is finely ground to expose active hydroxyl ions. Ferric hydroxide, finely ground kaolin, and a Podzol B horizon were found to fix large amounts of phosphate in an unavailable form. When a suspension of any of these materials was mixed with soluble phosphate of similar pH, the resultant mixture increased in pH, indicating that phosphate ions replaced the hydroxyl ions.

Dehydration and removal of hydroxyl ions by high temperatures greatly reduced the phosphate-fixing capacity of soils and of hydrated iron oxide, though hydrated aluminum oxide gave the reverse result. Removal of active iron and aluminum (R_2O_3) also greatly reduced the capacity of soils to fix phosphate. Both silicate and fluoride ions replaced hydroxyl ions, as evidenced by pH changes. The beneficial effect of silica on plant growth may be due to its ability to remove fixed phosphate or to replace the hydroxyl ions and thus decrease phosphate fixation.

Phosphate fixation in soil and its practical control, F. E. Bear and S. J Toth. (N. J. Expt. Stas.). (*Indus. and Engin. Chem., 34 (1942), No. 1, pp. 49–52, illus. 2*).—The quantities of phosphate consumed by soil micro-organisms are relatively small, most of the fixation being the result of precipitation and adsorption. Iron and aluminum serve as precipitating agents at pH values below 5.5, calcium plays a dominant role at pH 6.5, and magnesium becomes effective at 7.5. Precipitation by these ions is inadequate, however, to explain the high phosphate fixation which normally occurs, and which for Penn silt loam may amount to 125 tons of 20 percent superphosphate equivalent per 2 million pounds of soil. In soils of such high fixing capacity, most of the phosphate is colloid-bound or saloid-bound, the colloid-bound phosphate being replaceable by hydroxyl, humate, and silicate ions, and the saloid-bound phosphate by sulfate, chloride, citrate, and tartrate ions. Excessive fixation can be avoided by placing phosphate in bands or by the use of granular forms.

As the quantity of phosphate applied is increased, a change from the shallow along-the-row method of application to avoid positional unavailability appears advisable. Placement of most of the phosphate below the zone affected by cultivation and summer drought is suggested. Heavy phosphating, such as is required on acid potato soils, increases their exchange capacity and lowers the pH at which iron and aluminum become soluble.

Phosphate deposits of the world, G. R. Mansfield (*Indus. and Engin. Chem., 34 (1942), No. 1, pp. 9–12*).—The three great phosphate-bearing regions of the world are the United States, the U. S. S. R., and North Africa. Reserves in various countries are given. The principal phosphate deposits of the United States are briefly discussed, and estimates of reserves are included.

The penetration of phosphate into the kaolinite crystal, C. A. Black. (Iowa Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 157–161, illus. 2*).—Experiments with kaolinite and the clay fraction of the Cecil clay soil treated to remove free iron and aluminum oxides and exchangeable bases showed that the longer the period of time the phosphate solution was allowed to remain in contact with the clays and the more concentrated the phosphate solution used in fixation, the more phosphate was fixed by the clays and the less could be extracted. The author thus concludes that a part of the fixed phosphate had penetrated between the lattice layers and was not readily extracted.

The stability of admixed rock phosphate in cured concentrated superphosphate, W. H. MacIntire and L. J. Hardin. (Tenn. Expt. Sta. et al.). (*Jour. Assoc. Off. Agr. Chem., 25 (1942), No. 1, pp. 168–176*).—Mixtures that contained monocalcium phosphate and one of several forms of tricalcium phosphate were cured at 45° C. and at room temperature for 28 days. It is concluded that the acidic phosphate reacted to form dicalcium phosphate and increase substantially the "availability" of the fluoride-free "hydrated" tricalcium phosphate; reacted upon a synthetic near-fluorophosphate, $Ca_{10}F_2(PO_4)_6$, to a slight extent; reacted readily with the tricalcium phosphate of defluorinated fused rock phosphate to form dicalcium phosphate; and reacted with the calcium carbonate and other basic components of Canadian apatite and Tennessee raw rock, without apparent disintegration of their apatite contents. The activities of the reagent monocalcium phosphate and the water-soluble content of concentrated superphosphate toward raw rock were essentially identical in comparable mixtures. It is further concluded that, since the water-soluble phosphate content of superphosphate does not react with the apatite content of added raw rock phosphate, such additions cause no true enhancement in available P_2O_5 content.

Composition and properties of superphosphate: Volatilization of fluorine in superphosphate manufacture, K. D. Jacob, H. L. Marshall, D. S. Reynolds, and T. H. Tremearne. (U. S. D. A.). (*Indus. and Engin. Chem., 34 (1942), No. 6, pp. 722–728*).—In the production of ordinary superphosphate about 11 to 42 percent of the fluorine in the phosphate rock is volatilized during the mixing and denning operations, and the greater portion of the volatilized fluorine can easily be recovered as aqueous solutions of hydrofluosilicic acid. Also, small quantities of fluorine are volatilized during the subsequent handling of the fresh superphosphate. In general, the percentage volatilization of the fluorine tends to decrease with increase in the phosphorus content of the rock. With rocks of the same phosphorus content, the fluorine volatilization is somewhat higher from Tennessee brown rock than from Florida land pebble. Mainly because of the much smaller quantities of fluorine in furnace-made phosphoric acid, double superphosphates produced with wet-process phosphoric acid usually contain considerably more fluorine than do those produced with furnace acid. Studies of the distribution of fluorine among the calcium sulfate waste and the intermediate and final products of the manufacture of double superphosphates by the wet method showed cumulative volatilizations of fluorine ranging from 36 to 54 percent of the total fluorine in all the phosphate rock used.

Defluorination of phosphate rock in the molten state: Factors affecting rate of defluorination, K. L. Elmore, E. O. Huffman, and W. W. Wolf (*Indus. and Engin. Chem., 34 (1942), No. 1, pp. 40–48, illus. 16*).—The defluorination of phosphate rock in the molten state was studied at temperatures varying from 1,450° to 1,600° C., the effects of the composition and depth of charge and of water vapor concentration and velocity of furnace atmosphere upon the rate of defluorination being represented by a general equation.

Fluorine content of plants fertilized with phosphates and slags carrying fluorides, W. H. MacIntire, S. H. Winterberg, J. G. Thompson, and B. W. Hatcher. (Tenn. Expt. Sta. et al.). (*Indus. and Engin. Chem., 34 (1942), No. 12, pp. 1469–1479, illus. 5*).—Neither toxic effect upon germination nor appreciable enhancement in the fluorine content of forage crops (red clover and Sudan grass) was induced by incorporations of calcium fluoride. No toxic effects resulted from fluorides supplied by single incorporations either (1) of concentrated superphosphate equal to 448 incorporations of 500 lb. of ordinary superphosphate per acre or (2) of slag that introduced the fluorine equivalent of 896 such 500-lb. incorporations.

It is concluded that livestock will suffer no ill effect from the feeding of forage crops grown on soils fertilized with fluoride-bearing phosphates and liming materials.

An appraisal of calcium and potassium metaphosphates as sources of phosphorus for crop plants, B. E. Brown and K. G. Clark. (U. S. D. A.) (*Amer. Fert., 98 (1943), No. 5, pp. 10–11, 24, 26*).—Calcium metaphosphate and potassium metaphosphate were compared with superphosphate in pot tests with Caribou loam, pH 4.6; Chester loam, pH 6.5; Norfolk loamy fine sand, pH 5.5; and Sassafras fine sandy loam, pH 5.6. Millet, oats, and wheat were used as indicator crops. Calcium metaphosphate gave a higher yield than superphosphate in 7 of the 12 tests, and in 6 the yield with potassium metaphosphate exceeded that with superphosphate. No indication of injurious effects was observed.

Calcium in the soil, I–III (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 8–35, illus. 22*).—Three papers are presented.

I. *Physico-chemical relations,* R. Bradfield (pp. 8–15) (Cornell Univ.).—A discussion limited largely to the physical chemistry of the system Soil – $CaCO_3$ – CO_2 – H_2O. The author points out that most of the other important reactions in soil chemistry are greatly influenced directly or indirectly by the above reactions.

II. *Biological relations,* W. H. Pierre and W. H. Allaway (pp. 16–26) (Iowa Expt. Sta.).—A discussion on the biological relations of calcium, with major emphasis on factors affecting the availability of soil calcium to plants. Related factors are briefly noted, with a list of 78 references on the general subject.

III. *Pedologic relations,* H. Jenny (pp. 27–35) (Univ. Calif.).—A discussion and presentation of data on factors and processes of soil formation as related to the influence of calcium in natural soils.

Distribution of total and alkali-soluble organic matter between the whole soil and soil aggregates of Dunmore silt loam.—I, Influence of fertility treatments 6 and 18 months after liming, J. Elson and E. Azar. (Va. Expt. Sta. and U. S. D. A.). (*Soil Sci., 55 (1943), No. 2, pp. 177–183*).—Whole soil and both aggregate-size groups (1.0–2.0 and 0.10–0.25 mm., respectively) from manured or fertilized subplats contained more alkali-soluble organic matter than the untreated, and the manured more than the fertilized.

The total organic matter data showed that the regressions of the treatment difference (treated v. untreated) for the small aggregates on whole soil or on large aggregates were not significant in either period. The alkali-soluble organic matter showed that in both the 6- and 18-mo. periods the regression of treatment difference (treated v. untreated) for the large aggregates on that for the whole soil was not significant. The percentage of the total organic matter in the large aggregates that was alkali-soluble was 57.9 after 6 mo. and 58.3 after 18 mo. for the aggregates, whereas that in the whole soil fell from 56.9 to 54.3 for the corresponding periods. Six mo after liming there was good agreement for the treatment difference (treated v. untreated) for the comparisons small aggregates v. whole soil or v. large aggregates. After 18 mo. these same comparisons showed little relationship. Fertilizer treatments as well as manure treatments maintained the total and the alkali-soluble matter content of the whole soil. This was correlated in nearly all cases with an increased percentage of organic matter in the large and small aggregates.

Magnesium retention in soils in relation to form and rates of additions, W. H. MacIntire, W. M. Shaw, J. B. Young, and B. Robinson. (Tenn. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 233–237*).—Results are presented from a 27-yr. lysimeter study on the effect of form, particle size, rate, and zone of incorporation in the soil on outgo of magnesium from Cumberland silt loam.

Domestic sources of agricultural magnesium, C. W. Whittaker and W. H. Ross. (U. S. D. A.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 228–232*).—The changing position of magnesium in American agriculture is outlined briefly. Potential and actual sources of fertilizer magnesium are surveyed, with suggestions as to possible future trends. The lack of water-soluble magnesium salts for agricultural use has been met by the magnesium oxides and by domestic sulfate of potassium and magnesium. Extensive magnesium deficiencies such as followed the World War will be prevented by the use of these materials and by the use of dolomite. It was concluded that defense operations were not competing seriously with agricultural magnesium at the time of writing and that they were not likely to do so in the near future.

Possible mechanisms of boron fixation in soil.—I, Chemical, R. Q. Parks and B. T. Shaw. (Ohio Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 219–223, illus. 1*).—Solutions of salts of silicon, aluminum, iron, calcium, magnesium, and phosphorus and suspensions of electrodialyzed humus and bentonite were mixed with boric acid and titrated to reactions varying from pH 5.0 to 9.0. Spectrographic analyses showed appreciable quantities of total and hot-water-insoluble boron in many of the resulting precipitates. Boron fixation was found to be favored by reactions above neutrality, by drying, and by the presence of calcium ions in the mixtures being precipitated. A possible mechanism of boron fixation in soils is advanced and discussed.

Sulfur deficiency and its effect on cotton production on Coastal Plain soils, O. R. Younge. (Ark. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 215–218, illus. 1*).—Fertilizer treatments with sulfur and its effect on cotton production is reported for 10 soil types in the Coastal Plain of southwestern Arkansas. Of the 10 sites reported, 6 showed significant yield reduction where sulfur was not applied as compared with applications of 12 lb. of sulfur per unit of 4–10–4 fertilizer. The maximum reduction recorded is 104 lb. lint per acre, or 18 percent for a basic treatment of 8 units of 4–10–4 fertilizer. As an average of all 10 sites, the lint yield reductions were 26 and 42 lb. per acre at the 4- and 8-unit treatment rates, respectively, or a decrease of 7 and 10 percent at each rate, representing a net loss of approximately $4 and $6 per acre, respectively, at prevailing prices. Sulfur deficiency is shown to cause a marked reduction in the number of bolls produced. The mean reductions for 7 sites operating in the same season were 9,000 and 15,000 bolls per acre at the 4- and 8-unit rate of 4–10–4 treatment, respectively, where sulfur was not applied. The reduction in number of bolls was associated with reduction in yield, as boll size was not appreciably affected. Insufficient sulfur was shown to delay growth development, as indicated by the lower percentage of the yield being ready for harvest at the first picking, the reduction amounting to 7 units in terms of percent earliness, or about one-ninth. Sulfur deficiency was found to have little effect on staple length, size of bolls, and lint turn-out. Yields of seed cotton and seed were found to vary directly with the associated lint yield.

The influence of zinc on the productivity of certain New York peat soils, E. V. Staker and R. W. Cummings. (Cornell Univ.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 207–214, illus. 1*).—The unproductivity of certain peat soils of western New York State was found to be due to large amounts of zinc. Polarograph, greenhouse, and chemical studies were conducted. A detailed field survey of surface soils from affected areas showed a zinc content of from 0 to 6.7 percent based on the dry weight of the soil. Low productivity was associated with high concentrations of zinc. Calcium hydroxide gave the best results as a corrective.

Wartime fertilizers for New Jersey (*New Jersey Stas. Cir. 456* (*1943*), *pp.* [*8*]).—A revision of Circular 452 (E. S. R., 88, p. 168).

Commercial fertilizers report for 1942, E. M. Bailey (*Connecticut* [*New Haven*] *Sta. Bul. 467* (*1942*), *pp. 52*).—Analyses of fertilizers and liming materials sold in the State during 1942 are reported.

AGRICULTURAL BOTANY

A note upon the utilization of xylose and xylan by Azotobacter, H. L. Jensen (*Linn. Soc. N. S. Wales, Proc., 67* (*1942*), *pt. 5–6, pp. 318–320*).—Xylose was not utilized by *A. chroococcum* and only slightly by *A. vinelandii*. Nitrogen can be fixed through the intervention of other bacteria capable of transforming the xylose into compounds available to *Azotobacter*. Xylan may be utilized in association with such organisms in addition to others that hydrolyze the xylan. Arabinose was utilized very well by *A. vinelandii* but not by *A. chroococcum*.

Phosphorolysis and synthesis of sucrose with a bacterial preparation, M. Doudoroff, N. Kaplan, and W. Z. Hassid. (Univ. Calif.). (*Jour. Biol. Chem., 148* (*1943*), *No. 1, pp. 67–75*).—A dry preparation of *Pseudomonas saccharophila* was found capable of phosphorolyzing sucrose to glucose-1-phosphate and fructose. With glucose-1-phosphate and fructose as substrates, the formation of sucrose could be demonstrated by reversal of the above reaction. The possible competing hydrolytic and phosphorolytic properties of the preparation are summarized.

Growth factors for bacteria.—XIV, Growth requirements of Acetobacter suboxydans, L. A. Underkofler, A. C. Bantz, and W. H. Peterson. (Iowa State Col. and Univ. Wis.). (*Jour. Bact., 45* (*1943*), *No. 2, pp. 183–190*).—In continuation of this series (E. S. R., 88, p. 175), riboflavin was found to be synthesized, pantothenic acid (or one of its components) and *p*-aminobenzoic acid were required, and S. M. A. Biotin Concentrate No. 1000 furnished another essential factor, not biotin but shown by other investigators to be nicotinic acid. Hydrolyzed casein alone furnished adequate N for nutrition of the organism, but excellent growth was obtained when a known mixture of amino acids replaced it.

Some interrelationships of pyridoxine, alanine, and glycine in their effect on certain lactic acid bacteria, E. E. Snell and B. M. Guirard (*Natl. Acad. Sci. Proc., 29* (*1943*), *No. 2, pp. 66–73*).—Alanine in sufficient concentration (but no other amino acid tested) completely replaced pyridoxine for *Streptococcus lactis*; glycine inhibited growth; and threonine, serine, and β-alanine were inhibitory at higher levels. Inhibition by each of these substances was counteracted by adding more pyridoxine; no other vitamin had this action. Such inhibition was also counteracted by alanine, but by no other amino acid used. Possible explanations for these findings are discussed, and it is suggested that alanine may serve as a direct precursor of pyridoxine for *S. lactis*. There are 23 references.

The biosynthesis of thiamine by normally athiaminogenic microorganisms, G. W. Kidder and V. C. Dewey (*Growth, 6* (*1942*), *No. 4, pp. 405–418*).—*Phytophthora cinnamomi* and two ciliates (*Tetrahymena geleii* and *T. vorax*) synthesized thiamin in the presence of factor S, but the first only when thiamin intermediates were supplied. A third ciliate (*Glaucoma scintillans*) required thiamin from without. It was shown from the growth characteristics of *Phycomyces blakesleeanus* that the pyrimidine and thiazole components of thiamin could both be destroyed by ultraviolet radiation for 4 hr. under the test conditions. Factor S was found only in material from plant sources and was more concentrated in leaves of higher plants than elsewhere. It is a highly stable substance which is believed capable of catalyzing the reaction for formation of the thiamin molecule from its intermediates, but it does not appear to be connected with the synthesis of the latter.

Notatin: An anti-bacterial glucose-aerodehydrogenase from Penicillium notatum Westling, C. E. Coulthard, W. F. Short, R. Michaelis, G. Sykes, G. E. H. Skrimshire, A. F. B. Standfast, J. H. Birkinshaw, and H. Raistrick (*Nature* [*London*], *150* (*1942*), *No. 3813, pp. 634–635*).—A preliminary note.

Strain specificity and production of antibiotic substances, S. A. Waksman and A. Schatz. (N. J. Expt. Sta.). (*Natl. Acad. Sci. Proc., 29* (*1943*), *No. 2, pp. 74–79*).—Maximum formation of clavacin by *Aspergillus clavatus* in the culture medium corresponded with maximum growth, after which its activity was rapidly destroyed by inactivation rather than by disappearance of the substance itself. Only 6 of the 15 strains under study produced any considerable amounts of clavacin, but in all cases it was the same biologically and apparently also chemically. It appears that too hasty generalizations as to the ability of certain fungi to produce antibacterial substances, based on the study of single strains of a particular organism, are to be avoided.

Descriptions of tropical rusts, V, G. B. Cummins. (Ind. Expt. Sta.). (*Bul. Torrey Bot. Club, 70* (*1943*), *No. 1, pp. 68–81, illus. 11*) —Of the 40 rust-fungus species considered in this installment (E. S. R., 86, p. 639), new taxonomy is involved in 14.

Répertoire des plantes médicinales et aromatiques d'Algérie [Manual of the medicinal and aromatic plants of Algeria], Fourment and Roques (*Gouvt. Gén. Algérie, Dir. Écon. Algérienne, Bul. 61* [*1942*], *pp. 159, illus. 108*).

A key to the North American species of the genus Scirpus based on achene characters, A. A. Beetle (Univ. Calif.). (*Amer. Midland Nat., 29* (*1943*), *No. 2, pp. 533–538, illus. 44*).

Notes on the nomenclature of Carya Nutt., E. L. Little, Jr. (U. S. D. A.). (*Amer. Midland Nat., 29* (*1943*), *No. 2, pp. 493–508*).

The status of Distichlis dentata, J. R. Reeder. (Oreg. State Col.). (*Bul. Torrey Bot. Club, 70* (*1943*), *No. 1, pp. 53–57, illus. 2*).—*D. dentata* is reduced to a synonym of *D. stricta.*

Nomenclatural changes in the genus Cuscuta, and notes on some American species, T. G. Yuncker (*Bul. Torrey Bot. Club, 70* (*1943*), *No. 1, pp 61–67*).—Eighteen species of this parasitic flowering plant are considered.

Plant succession on abandoned fields in the central Wisconsin sand plain area, J. W. Thomson, Jr. (*Bul. Torrey Bot. Club, 70* (*1943*), *No. 1, pp. 34–41, illus. 5*).—The succession in this Juneau County area was from a weed flora the first few years, with rapid changes in the succession, to prairie plants appearing in numbers at 9–10 yr. and reaching a maximum about 15 yr. after abandonment of the fields. Finally, the prairie plants declined as the forest represented by jack pine and oak became the climax.

The process of phagocytosis in Mycorrhizae, with especial reference to a phenological study of mycorrhizal phagocytosis in Fraxinus americana, A. P. Kelley (*Landenberg, Pa.: Landenberg Lab., 1943, pp. 16, illus. 3*).—Applying the term especially to the digestion of fungus material by a nonfungus cell, the author gives a general description of mycorhizal phagocytosis; summarizes its systematic occurrence, as indicated by the literature, in liverworts, mosses, and in various groups of flowering plants; and then presents the results of his study of the white ash (*F. americana*), including a phenological description of phagocytosis in this species and a discussion of the localization of the phagocytic area.

La infección artificial de las plantas leguminosas con bacterios radicícolas, E. Schiel (*Inst. Expt. Invest. y. Fomento Agr. Ganad.* [*Santa Fé, Argentina*], *Pub. Fomento 41* (*1941*), *pp. 19, illus. 5*).—An informatory summary of legume inoculation by nodule bacteria, with special reference to alfalfa in the

Province of Santa Fe, Argentina, and including detailed instructions for handling the cultures.

The "unknown factor" in the growth of Saccharomyces cerevisiae, L. H. Leonian and V. G. Lilly. (W. Va. Expt. Sta.). (*Jour. Bact., 45 (1943), No. 2, pp. 191–192*).—From culture tests reported it is concluded that the beneficial effect of yeast extract is not due to some unknown substance but to the raising of the low level of inositol, pantothenic acid, and biotin.

Concerning the relation between structure and action of xanthones on dehydrogenations by Fusaria, L. J. Sciarini, R. P. Mull, J. C. Wirth, and F. F. Nord (*Natl. Acad. Sci. Proc., 29 (1943), No. 3–4, pp. 121–126, illus. 2*).—Using a basic salt-solution medium, the values recorded indicated that the xanthones applied both increased and decreased the growth of the *Fusarium lini* strain employed, accordingly giving rise to a higher or retarded rate of dehydrogenation of isopropyl alcohol, as compared with the values of the blank or with the effect of nicotinic acid.

Effects of vitamins on germination and growth of orchids, G. R. Noggle and F. L. Wynd. (Univ. Ill.). (*Bot. Gaz., 104 (1943), No. 3, pp. 455–459*).—Seeds of *Cattleya trianae mooreana X C. schroederae* germinated and grew normally in an artificial nutrient in which one lot of maltose was used as carbohydrate source, but no germination was obtained when a more purified maltose was substituted. Inability to germinate on the purified maltose was not overcome by adding thiamin, ascorbic acid, or calcium pantothenate, but a few seeds germinated with following slow development when riboflavin was added. Pyridoxine permitted good germination, but subsequent development was poor. However, both germination and development were good when nicotinic acid was supplied.

Further evidence on the significance of glycine, pyridoxine, and nicotinic acid in the nutrition of excised tomato roots, P. R. White (*Amer. Jour. Bot., 30 (1943), No. 1, pp. 33–36, illus. 3*).—Studies of four clones of tomato roots from three laboratories indicated both glycine and pyridoxin to be effective supplements to thiamin in the nutrition of these roots, the degree of response differing somewhat among the clones. Nicotinic acid appeared to improve growth when glycine, pyridoxin, and thiamin were present, but was without beneficial effect when combined with any one or two of these other substances. Best results were obtained when all four nutrilites were provided.

Growth of excised tomato roots in agar with thiamine plus pyridoxine, nicotinamide, or glycine, D. Day. (Cornell Univ.). (*Amer. Jour. Bot., 30 (1943), No. 2, pp. 150–156, illus. 2*).—Uniform pieces of inoculum were transferred from roots grown for 57 or more passages in a mineral-sugar solution containing thiamin or its thiazole intermediate to petri dishes containing a modified Pfeffer solution with 1 percent sucrose and 0.5 percent purified agar to which thiamin, pyridoxine, nicotinamide, neopeptone, glutamic acid, and glycine were added in various combinations. These were incubated in a moist chamber at 25° C. in darkness. In basal agar with no added growth substance the roots seldom grew for more than two passages. With added thiamin the root tips grew about 1.7 mm. daily for an unlimited number of passages. When pyridoxine was added with thiamin the daily rate was about 5 2 mm. Roots in this medium showed the characteristic hooks and curls noted by Robbins and Schmidt (E. S. R., 81, p. 349). This curving appeared unrelated to the effects of gravity. Supplementing this medium with nicotinamide had no appreciable effect on the growth rate, but further addition of neopeptone decreased it. Addition of glutamic acid to the agar medium containing thiamin decreased the growth rate, but addition of glycine had little or no effect. Although root growth in the agar medium was less rapid than in the same medium without agar, health and vigor were maintained where suitable growth substances were present.

The mechanism of auxin action.—The effect of auxin on water absorption by potato tuber tissue, B. Commoner, S. Fogel and W. H. Muller (*Amer. Jour. Bot., 30 (1943), No. 1, pp. 23–28, illus. 5*).—In hypertonic sucrose solutions indole-3-acetic acid prevented the water loss normally occurring from tuber slices therein and in presence of KCl or potassium fumarate caused water to be absorbed. The effect of various auxin concentrations on water absorption from such solutions containing KCl is typical of their effect on growth processes. The influence of fumarate on the auxin effect is also described and shown to be similar to its effect on various growth processes. The findings do not conform with the theory that the auxin effect on cell elongation is due to an aftereffect on the plastic extensibility of the cell wall, but rather that the auxin-4-C-acid system regulates the active absorption of water and so causes cell elongation. This effect is believed due to the influence of the auxin system on the absorption of salt by plant cells. There are 18 references.

Auxin action, H. C. Eyster (*Science, 97 (1943), No. 2520, pp. 358–359*).—In this preliminary report, evidence is presented to indicate that the mechanism of auxin action is fundamentally the release of diastase and possibly sucrase and other enzymes from the protein colloidal substances to which they are normally attached. Thus any substance which releases the digestive enzyme from its colloidal carrier or slows the rate at which the enzymes are being bound to the colloid, without unduly upsetting any vital process, can apparently act as a growth substance. The indole compounds are more satisfactory because they are milder in their effects. The indications appear to be that in phototropism the auxin does not shift from the lighted to the shaded side and that it is neither metabolically used up nor destroyed by light, but that correspondingly more auxin is needed where the enzyme has been more strongly adsorbed—a condition directly proportional to light exposure.

Root-inducing activity of phenoxy compounds in relation to their structure, A. E. Hitchcock and P. W. Zimmerman (*Contrib. Boyce Thompson Inst., 12 (1942), No. 7, pp. 497–507, illus. 4*).—Compared with β-indolebutyric and α-naphthaleneacetic acids, the root-inducing activity on cuttings of horticultural varieties for the substituted phenoxy compounds was as follows: The monohalogen substituted acids less, (2,4)-dichloro- and dibromophenoxyacetic acids equal or greater, and the corresponding α-propionic and α-butyric homologs 30 to 100 times greater. The descending order of activity for monosubstituted phenoxyacetic acids on *Euonymus* cuttings was para>ortho>meta; Cl>I at the ortho position; $Cl>NH_2>NO_2$ at the meta position; and $Cl>Br>NH_2$ at the para position. The root-inducing activity of phenoxyacetic acid (practically inactive) was augmented by increasing the length of side chain or by substitutions in the ring. An additional increase in root-inducing activity resulted from increasing the side chain of the dihalogen substituted phenoxyacetic acids, although these higher propionic and butyric homologs were inactive for modification. Mixtures of three dichlorophenoxy homologs or of dichlorophenoxyacetic acid and either or both β-indolebutyric and α-naphthaleneacetic acids were more effective than the individual compounds. The ratio of the different compounds in the mixture was a limiting factor. All active phenoxy compounds induced marked fasciation of roots at concentrations slightly above optimum.

Flowering habit and correlation of organs modified by triiodobenzoic acid, P. W. Zimmerman and A. E. Hitchcock (*Contrib. Boyce Thompson Inst., 12 (1942), No. 7, pp. 491–496, illus. 3*).—Triiodobenzoic acid was shown to regulate plant growth, influencing flowering, growth habit, and correlation of organs. Solutions applied to the soil or sprayed on the plants gave similar results. Under the influence of this substance axillary buds which normally produced leafy shoots were induced to grow flower clusters. The main shoot also lost the shoot-producing bud and terminated in flower clusters. It is concluded that although triiodobenzoic acid does not cause immediate cell elongation of test objects (tomatoes used principally here), the ultimate results more nearly resemble those of the true hormones than of the well-known indole and naphthalene compounds usually referred to as auxins.

Translocation of the floral stimulus in Xanthium, A. P. and R. B. WITHROW. (Ind. Expt. Sta.). (*Bot. Gaz., 104 (1943), No. 3, pp. 409–416, illus. 3*).—The floral stimulus in *X. pennsylvanicum* crossed an inarch contact between induced donor and receptor plants only when tissue union was established and direct tissue contact was uninterrupted for over 4 days. This stimulus failed to be translocated downward from an induced leaf through dead petiole tissue or functional xylem cells. It failed to be translocated from an induced donor branch of a two-branched plant to a receptor branch when the bark was removed from the donor branch below the induced leaves or from the receptor branch immediately above the point of branching. The floral stimulus is translocated chiefly in the bark, both up and down the stem.

Transplantation experiments in peas, III, F. W. WENT (*Bot. Gaz., 104 (1943), No. 3, pp. 460–474*).—In continuation (E. S. R., 81, p. 767), the percentage of successful grafts of seedlings grown in darkness at 24° C. and 80 percent humidity dropped rapidly when the plants were over 8 days old, both when used as stock or scion. No considerable improvement was noted when the cut surfaces were treated with growth substances. When stem pieces of varieties which as stock produce considerable differences in scion growth were grafted as intermediate stems betwen pieces of one test variety, they did not influence the scion. The effect of stock on scion is believed due exclusively to cotyledons and root system. There was no correlation of the auxin content of the tip with stem growth rate or stock variety, indicating that the growth rate in these grafts was not limited by auxin but by another factor coming from the stock, viz, caulocaline, as concluded in the first paper of the series (E. S. R., 79, p. 314). Lowered viability of pea seeds on storage was not found due to a decrease in growth substances in the cotyledons; the only observable effect of age was decreased resistance to premature rotting. The protein content of the scion followed very closely its growth rate. The genetic characters Stipuleless, Acacia-leaf, and Rogue varieties were not accompanied by appreciable changes in growth-substance content of the stocks; they were due almost entirely to changes in reactivity of the tissues. On the other hand, decreased development of leaves, stipules, petioles, and tendrils due to soaking the peas in water for 1–6 days is caused by decrease in growth-substance content of the cotyledons and not by changes in tissue reactivity to growth substances.

The source and phosphatase activity of exoenzyme systems of corn and tomato roots, H. T. ROGERS, R. W. PEARSON, and W. H. PIERRE. (Iowa Expt. Sta.). (*Soil Sci., 54 (1942), No. 5, pp. 353-366, illus. 8*).—Microscopic examination of the cellular materials released by roots to the rhizosphere during normal growth showed them to be composed largely of well-nucleated intact cells, which underwent considerable swelling and elongation soon after leaving the root proper. There was some evidence of rupture and release of the contents of a few of these cells in the solution cultures used, but the bulk of the cells appeared to maintain a well-preserved condition for a considerable time after detachment. The previous level of P nutrition of corn and tomato plants had no measurable effects on the nuclease activity of their roots, but in P-starved plants the roots exhibited a slightly higher glycerophosphatase activity than in those given ample P for 8 days prior to the tests. The glycerophosphatase system of corn roots had an optimum reaction of pH 4 at 27° C. in 12-hr. tests, and maximum activity of the same system at pH 4 and 45° was obtained in 9-hr. tests. The optimum reaction for the nuclease system of corn roots, as measured by release of inorganic P at 27° in 12 hr., was about pH 6.3. The maximum activity of this system was obtained at 60° and pH 7 for 12 hr. There are 41 references.

Curado o fermentación del tabaco [Tobacco curing and fermentation], W. A. Bertullo (*Rev. Asoc. Ingen. Agrón.* [*Montevideo*], *14* (*1942*), *No. 4, pp. 53–56; Eng. abs., p. 56*).—After outlining the standard processes, the author discusses the chemical, bacterial, and diastatic theories of tobacco fermentation.

Plant growth under controlled conditions.—I, The air-conditioned greenhouses at the California Institute of Technology, F. W. Went (*Amer. Jour. Bot.*, *30* (*1943*), *No. 2, pp. 157–163, illus. 3*).—A full description is given of the construction and operation of a set of air-conditioned greenhouses. The relatively low operating cost and almost complete control of external conditions are said to make these houses ideal for plant physiological work.

Vegetative propagation of red squill, A. Hartzell (*Contrib. Boyce Thompson Inst.*, *12* (*1942*), *No. 7, pp. 481–483, illus. 1*).—*Urginea maritima* was propagated by scales from bulbs under greenhouse conditions. Powder made from bulbs of the same red squill strain as used for such propagation proved toxic to rats.

An auxanometer for continuous recording of potato tuber growth, C. F. Dietz and L. Verner. (Idaho Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc.*, *40* (*1942*), *pp. 509–512, illus. 2*).—The auxanometer described and illustrated is said to lend itself well to the study of the growth of a tuber in its natural environment, with sufficient precision to record minor variations in rate throughout the diurnal period. Though it measures increase in only one diameter, the recorded growth pattern accurately portrays fluctuations in relative growth rates, which should make it useful in studying effects of atmospheric conditions, soil moisture, sprays, and other factors suspected of influencing tuber growth.

The relationship between growth and metabolism in the oat seedling, H. G. Albaum and B. Eichel (*Amer. Jour. Bot.*, *30* (*1943*), *No. 1, pp. 18–22, illus. 7*).—Based on observations that the early growth and metabolism are insensitive to potassium iodoacetate (a sugar poison) and cannot be stimulated by potassium pyruvate and the 4-C dicarboxylic acids, evidence is presented to show that metabolism of oats seedlings at 24–72 hr. differs from that at 72–144 hr. These findings are interpreted as indicating that sugar is probably not being metabolized during the early growth stages, and measurements on the total ether-soluble fraction point clearly to the metabolism of fat. During early stages (up to 72 hr.) the O_2 uptake as well as growth can be inhibited by sodium azide. Data at hand suggest that the azide effect is on a cytochrome oxidase system which appears to cease functioning in older seedlings. The metabolism beyond 72 hr. probably utilizes sugar as the principal substrate, as suggested by a sensitivity of growth and metabolism to iodoacetate poisoning, stimulation by sugar intermediates, and a high respiratory quotient approaching unity with time. This is further substantiated by the fact that fat disappearance has slowed down by 72 hr and the reducing sugars begin to be utilized rapidly at about this time.

Synthesis of β-2-trichloroethyl-D-glucoside and its isolation from corn and dandelion plants treated with chloral hydrate, L. P. Miller (*Contrib. Boyce Thompson Inst.*, *12* (*1942*), *No. 7, pp. 465–470*).—"Deacetylation of synthetic β-2-trichloroethyl-*d*-glucoside tetraacetate gave crystalline β-2-trichloroethyl-*d*-glucoside, m. p. 152.5° to 153.5° and $[\alpha]_{D}^{\circ} = --39.7^{\circ}$ (H_2O). Corn plants grown in a medium containing chloral hydrate were shown to form β-2-trichloroethyl-*d*-glucoside in both tops and roots through the isolation of glucoside as the crystalline acetate. Deacetylation of some of the acetate from the tops yielded β-2-trichloroethyl-*d*-glucoside. β-2-Trichloroethyl-*d*-glucoside was also obtained as the tetraacetate from both tops and roots of dandelion plants which had been treated with chloral hydrate. This glucoside was also obtained in crystalline form directly from the leaves by ether extraction of aqueous extracts which had been subjected to lead precipitation. In addition, a new glycoside, not yet identified, was isolated as the crystalline acetate from the leaves. This appears to be a trichloroethyl glycoside involving a C_{11} disaccharide."

Effect of the addition of nitrogen upon germination of seeds of Symphoricarpos racemosus, F. Flemion (*Contrib. Boyce Thompson Inst., 12 (1942), No. 7, pp. 485–489*).—Snowberry seed will germinate only when the outer hard seed coat has been partially destroyed prior to a period at low temperature to after-ripen the dormant embryo. This break-down of the seed coat can be induced by keeping the seed in moist peat moss at 25° C. for 3–4 mo. preceding the low temperature period. Experimental results here presented show that addition of nitrogen compounds to the peat moss during the 25° period favors subsequent germination.

Relationship of dissociation of cellular proteins by incipient drought to physiological processes, H. T. Northen. (Univ. Wyo.). (*Bot. Gaz., 104 (1943), No. 3, pp. 480–485, illus. 1*).—With use of the centrifuge method to determine the structural viscosity of protoplasm in leaf cells of *Mnium* sp. and *Bryum* sp. which had been dried for periods up to 50 min. and in other tests in dried plants of *Mnium* placed in water for 15–90 min., incipient drought was found to condition a decrease in such viscosity as a consequence of protein dissociations. During the recovery period a decrease in viscosity preceded the return to normal. It is suggested that the dissociation of cellular proteins by incipient drought conditions an increased protoplasmic swelling pressure and accelerated rates of respiration and polysaccharide hydrolysis, and may at times lead to mitotic abnormalities. There are 44 references.

The chlorophyll-protein complex.—I, Electrophoretic properties and isoelectric point, M. Fishman and L. S. Moyer. (Univ. Minn.). (*Jour. Gen. Physiol., 25 (1942), No. 5, pp. 755–764, illus. 4*).—Reported effects of different conditions on the stability of the purified chlorophyll-protein complex were confirmed by this study. The electrophoretic behavior of this complex (E. S. R., 87, p. 203) prepared from two unrelated plants (***Aspidistra elatior*** and ***Phaseolus vulgaris***) was investigated and shown to be dissimilar. In M/50 acetate buffer at 25° C., the isoelectric point of the complex from bean was at pH 4.7, that from ***Aspidistra*** at pH 3.9 (extrapolated). These values are within the usual range of protein isoelectric points. Treatment with weak acids caused an irreversible denaturation of the complex from both plants, with a resultant shift in the mobility-pH curves to more basic values. Differences in electrophoretic behavior between the chlorophyll-protein complex and the cytoplasmic proteins of bean were demonstrated, the isoelectric point of the latter being at pH 4.22.

The chlorophyll-protein complex.—II, Species relationships in certain legumes as shown by electric mobility curves, L. S. Moyer and M. M. Fishman. (Univ. Minn.). (*Bot. Gaz., 104 (1943), No. 3, pp. 449–454, illus. 4*).—Using the complex prepared from leaves of the legumes ***Phaseolus vulgaris, P. limensis, P. coccineus, Vigna sesquipedalis, Dolichos lablab, Glycine max, Medicago sativa, Trifolium pratense, Melilotus alba, Vicia faba,*** and ***Pisum sativum,*** the electrophoretic mobility-pH curves showed close relationship but differed completely from the curve for ***Aspidistra.*** The various sets of data from these legumes could be described by a single smooth curve shifted up or down the pH scale to pass through each isoelectric point. In some cases minor deviations were noted, but in general the agreement was good. It is suggested that the complex from each species is characterized by essentially the same protein, slightly altered in certain respects from the rest but retaining enough of its original character to indicate relationship.

Effect of mineral salts on photosynthesis in relation to the amount of assimilates in the leaf, G. P. USTENKO (*Compt. Rend.* (*Dok.*) *Acad. Sci. U. R. S. S., n. ser., 32* (*1941*), *No. 9, pp. 661–663*).—Severed sugar beet leaves previously kept in darkness gave a higher photosynthetic rate than those kept in the light, irrespective of whether water or a salt solution were injected. Injection of NH_4NO_3, $Ca(H_2PO_4)_2$, $MgSO_4$, or $ZnSO_4$ also often increased photosynthesis in the light-treated leaves, which were higher in assimilates. Since these salts contained N, P, or S, it is believed that they hastened the use of carbohydrates in synthesis and relieved the photosynthetic apparatus from excess primary assimilates, thus increasing the photosynthetic rate. Injection of KCl and H_3BO_3 solutions into the leaves caused reduced photosynthetic activity, probably from too high a concentration. In all lots of leaves, photosynthesis was especially strong when injected leaves had been kept in darkness. The data indicate the close relation of photosynthesis, accumulation of assimilates, and mineral absorption by the plant.

The effect of manganese sulfate on the photosynthetic activity of frenched tung foliage, W. REUTHER and F. W. BURROWS. (U. S. D. A.). (*Amer. Soc. Hort. Sci. Proc.*, *40* (*1942*), *pp. 73–76, illus. 1*).—Though preliminary studies (E. S. R., 78, p. 655) had shown that in the earlier stages the chlorotic areas could be restored to a normal green color by treatment with dilute $MnSO_4$ solution, this brief report of the results of 1941 experiments suggests that there was no very pronounced effect of dipping the leaves in a solution containing 1 percent $MnSO_4$ and 0.5 percent $CaCO_3$ on the rate of photosynthesis, and that frenching was not a very serious yield-reducing factor. However, examination of the data in relation to the prevailing light and temperature conditions showed that during the very cloudy weather, associated with rains, light may have been the limiting factor for both chlorotic and Mn-treated leaves. It is also possible that some factor such as high leaf temperature, solarization, or stomatal closure might frequently limit the process in tung foliage under Florida field conditions.

Photoperiodic aftereffects in Ipomoea, V. A. GREULACH. (Ohio State Univ.). (*Ohio Jour. Sci.*, *43* (*1943*), *No. 2, pp. 65–73, illus. 1*).—*I. hederacea* and *I. purpurea* plants exhibited photoperiodic aftereffects in varying degrees when transferred to long photoperiods after having been exposed to different numbers of 9-hr. photoperiods. In general, more short photoperiods were necessary to induce anthesis than flower bud formation, and still more to induce fruit formation. The aftereffects were usually more pronounced with increase in number of short photoperiods and with increase in age of plants at the beginning of treatments, but reproductive development was not as extensive in the transfer plants as in those retained under the short photoperiods from beginning to end. A pale strain of *I. hederacea* exhibited more marked aftereffects than a dark green strain, and the aftereffects in *I. purpurea* were less marked than in either strain of *I. hederacea*. The latter was found not to be a strictly short-day plant, though the added influence of the short-day treatments was clearly evident; in *I. purpurea* the flower buds developed only on exposure to 2 or more short days. Terminal flower bud formation occurred only after exposure to minima of 2–7 short days in *I. hederacea* and of 8–17 in *I. purpurea*, and was much more frequent in the former. The minimum number of short photoperiods inducing anthesis in *I. purpurea* was three and in *I. hederacea* two (one exception). Anthesis began in 21–30 days after initiation of treatments. The number of short photoperiods necessary for induction of fruit formation was about the same as for initiation of terminal flower buds. The dark green strain of *I. hederacea* exhibited aftereffects following application of localized short days to one leaf, but much less markedly than in comparable plants exposed in their entirety.

The effect of culture filtrates on respiration in Chlorella vulgaris, C. A. SWANSON. (Ohio State Univ.). (*Amer. Jour. Bot., 30 (1943), No. 1, pp. 8–11, illus. 2*).

Origin and development of primary vascular tissues in seed plants, K. ESAU. (Univ. Calif.). (*Bot. Rev., 9 (1943), No. 3, pp. 125–206, illus. 13*).—This critical review (215 references) considers the origin of the vascular meristem in vegetative apexes and the course of differentiation of the first vascular elements in vegetative shoots of angiosperms and gymnosperms, vascularization of axillary and adventitious buds and of floral apexes, procambium and early vascular differentiation in roots, vascularization of embryos and seedlings, and the concept of primary and secondary vascular tissues. Some of the basic concepts determin ing the author's approach in evaluating terms, concepts, and interpretations are discussed.

Anatomical studies of the roots of juvenile lodgepole pine, R. J. PRESTON, JR. (Colo. State Col.). (*Bot. Gaz., 104 (1943), No. 3, pp. 443–448, illus. 8*).—These studies of *Pinus contorta latifolia* were made on the root systems of 105 trees, 1–15 yr. old, excavated with a pressure sprayer, 3 root types being recognized—taproot, lateral long roots, and lateral short roots. During dormancy, mycorhizal sheaths were found over the tips of lateral long roots, but on resumption of growth the tips burst through them. Mycorhizas did not appear to be strictly annual, and several instances were noted where they had achieved renewed growth at the beginning of the growing season by bursting through the fungus sheath. Active mycorhizas were also found on roots over a year old. Various details of the root anatomy are presented.

The ecological anatomy of ponderosa pine needles, A. E. HELMERS. (Univ. Idaho). (*Amer. Midland Nat., 29 (1943), No. 1, pp. 55–71*).—Certain anatomical features of *Pinus ponderosa* needles taken from different natural environments were compared biometrically, viz, the effects of sun. v. shade; northwest v. southeast sides, windward v. lee sides, and tips v. base of trees; and old v. young trees. There are 49 references.

Zonal structure and growth of the shoot apex in Microcycas calocoma (Miq.) A. DC., A. S. FOSTER. (Univ. Calif.). (*Amer. Jour. Bot., 30 (1943), No. 1, 56–73, illus. 16*).—A cytological, morphological, and developmental study. There are 42 references.

A comparison of the shoot apices of the Sequoias, G. L. CROSS (*Amer. Jour. Bot., 30 (1943), No. 2, pp. 130–142, illus. 15*).—In this study the author sought to procure additional information on the apical meristem in shoots of members of the Taxodiaceae and to compare the cellular patterns and sizes in the shoot apexes of closely related naturally occurring diploid and polyploid plants. Detailed results are presented.

Vascular differentiation in the shoot apex of Sequoia sempervirens, A. S. CRAFTS. (Univ. Calif.). (*Amer. Jour. Bot., 30 (1943), No. 2, pp. 110–121, illus. 36*).—The developmental processes are followed in detail.

The origin and certain trends of specialization of the vessel in the Monocotyledoneae, V. I. CHEADLE. (R. I. State Col.). (*Amer. Jour. Bot., 30 (1943), No. 1, pp. 11–17, illus. 9*).—Using all other plant organs except bulbs and corms, evidence is presented to show that characteristic tracheids have great length, are angular in outline, have inconstant width of walls in transverse section when the wall is thick, and have very slight or no development of an end wall; and that vessels have originated from tracheids. Details are presented and discussed.

Varietal differences in anatomy of cross-section of wheat grain, J. C. Bates. (Kans. Expt. Sta.). (*Bot. Gaz., 104 (1943), No. 3, pp. 490–493, illus. 10*).—The varieties Turkey, Tenmarq, Blackhull, Chiefkan, and Kawvale were used in this study.

Developmental anatomy of the fruit of the Deglet Noor date, E. M. Long. (U. S. D. A.). (*Bot. Gaz., 104 (1943), No. 3, pp. 426–436, illus. 19*).—Detailed data on the developmental anatomy are presented for seven periods from pollination to maturation at Indio, Calif. (1941).

Survey of anatomy, ergastic substances, and nuclear size in Echinocystis macrocarpa and Cucurbita pepo, F. M. Scott. (Univ. Calif.). (*Bot. Gaz., 104 (1943), No. 3, pp. 394–408, illus. 23*).—In this anatomical study, details of which are presented, comparisons of living material and prepared slides on both *E. macrocarpa* and pumpkin indicated the necessity of the former procedure in all studies pertaining to cell and nuclear growth.

The structure and development of the shoot apex of Ephedra altissima Desf., E. M. Gifford. (Univ. Calif.). (*Bul. Torrey Bot. Club, 70 (1943), No. 1, pp. 15–25, illus. 11*).—The cytohistological features of the shoot apexes of the two types of shoots in *E. altissima* are described. Comparison with other gymnosperms leads to the conclusion that the apical meristems of this species represent an advanced condition in the group.

Nature and rate of development of root system of Convolvulus arvensis, J. C. Frazier. (Kans. Expt. Sta.). (*Bot. Gaz., 104 (1943), No. 3, pp. 417–425, illus. 9*).—In a study of field bindweed plants from the seedling stage through 120 weeks of growth, the following points were established: The root system consists of the primary vertical root and one to many permanent laterals, the vertical extensions of which are termed secondary vertical roots. Unless prevented by injury or too severe competition, there are many additional permanent lateral and secondary vertical roots of the second and higher orders. Horizontal spread is by a series of permanent lateral roots. The primary permanent laterals arise on the primary vertical root. Succeeding orders of permanent lateral roots arise at the bend where a permanent lateral of the preceding order turns down to become a vertical root. The plants spread radially, by a series of lateral roots, 10½ ft. in one growing season and 17 ft. by the middle of the third, at which time many vertical roots had extended 14–16 ft. deep, and one was traced to a depth of 23 ft. The source of shoot development other than that arising from the plumule was determined as root-borne buds which form leafy shoots, directly if at or above the ground or rhizomes if below ground, which in turn give rise to leafy shoots. These arose in greatest abundance at the bend separating the lateral root of any order from its vertical phase. The shoot development of old plants is wholly from root-borne buds.

GENETICS

The inheritance of brittle rachis in barley, I. J. Johnson and E. Åberg, (Iowa Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 2, pp. 101–106*).—In the cross Peatland × C. I. 4821, two tough rachis varieties of *Hordeum vulgare*, complementary gene action ($Bt\ Bt\ bt_1\ bt_1$, and $bt\ bt\ Bt_1\ Bt_1$, respectively) was shown for brittle rachis. Crosses between these varieties with *H. agriocrithon*, a brittle rachis type, each gave a 3:1 ratio for brittle v. tough, indicating that the two dominant genes for brittle rachis carried separately in the cultivated varieties were allelic to the two dominant genes ($Bt\ Bt\ Bt_1\ Bt_1$) in *H. agriocrithon*. Ratios of 3:1 for black v. white and long-haired v. short-haired rachilla were obtained in the above crosses. Genes for colorless lemma and long-haired rachilla were allelic in the two species. Brittle rachis was inherited independently of glume color and rachilla hair length, and glume color and rachilla hair length were also independent. The genetic relationship between the two species in relation to the phylogeny of cultivated varieties of barley is discussed.

Genetic factors for mutability and mutant characters in Ustilago zeae, E. C. STAKMAN, M. F. KERNKAMP, T. H. KING, and W. J. MARTIN. (Minn. Expt. Sta.). (*Amer. Jour. Bot., 30 (1943), No. 1, pp. 37–48, illus. 7*).—Extensive studies have been continued since 1929 to determine the extent to which new biotypes can arise by mutation and through hybridization between biotypes within this species. Detailed results are here reported indicating that the tendency to mutate is governed by genetic factors and that clearly observable mutant characters persist through the sexual stage. At least 5,000 easily distinguishable biotypes were obtained from two haploid sporidia of opposite sex and with contrasting characters. Lines derived from crossing these two sporidia were crossed, and haploid segregates were again used to make a series of crosses for further observation. Many segregates proved extemely mutable, and at least 5,000 (or many more) distinct segregates and mutants were studied more or less intensively—all derivatives of the same two haploid sporidia.

It is concluded that *U. zeae* actually comprises an indefinite number of biotypes differing either widely or slightly in every observable character or combination of characters. New ones are continually produced as a result of mutation and of recombinations from interbiotypic hybridization. There are multiple sex groups—not merely two sexes—but there is relatively free interbreeding among biotypes, and mutation is almost unbelievably common in some. There is thus the most remarkable diversity within the species. Equally notable, however, is the fact that chlamydospores are surprisingly uniform, regardless of the particular cross producing them or of the time and place of their production in nature.

A comparison of synthetic varieties, multiple crosses, and double crosses in corn, G. F. SPRAGUE and M. T. JENKINS. (Iowa Expt. Sta. coop. U. S. D. A.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 2, pp. 137–147, illus. 1*).—The performance of five synthetic varieties and 16-line multiple crosses produced by crossing plants of the F_1, F_2, F_3, and F_4 generations, respectively, of their 8-line foundation strains is reported. Synthetic varieties have given about the same yield performance as adapted open-pollinated varieties, and their greatest usefulness may be as reservoirs of desirable gene combinations. Multiple crosses compared favorably in yield with the standard double crosses available and may have possibilities under adverse conditions where seed costs and variability in the crop are important.

The value of double cross hybrids involving inbreds of similar and diverse genetic origin, J. R. COWAN (*Sci. Agr., 23 (1943), No. 5, pp. 287–296*).—A positive and highly significant correlation existed between top-cross yields of unrelated corn inbreds and their yields in single crosses and predicted double crosses, but no correlation where related inbreds were used. Yields of single crosses from inbred lines classified from performance in top crosses were similar whether crosses were made between high × high or high × low combiners. Low × low combiners yielded distinctly less. Yields of single crosses and predicted double crosses among unrelated inbreds were significantly higher than those of crosses between related inbreds, indicating the feasibility of selecting inbreds for use in double crosses from diverse genetic origin.

The rate of root elongation in diploid and tetraploid Sudan grass and rye, E. GARBER. (Univ. Calif.). (*Amer. Nat., 77 (1943), No. 769, pp. 190–192*).—At all (20°–40° C.) temperatures, except 40°, roots of tetraploid Sudan grass elongated faster than those of diploid Sudan grass. Diploid rye roots grew faster than tetraploid rye at all temperatures, 15°–35°.

Interspecific hybrids in the genus Paspalum, G. W. Burton. (U. S. D. A. and Ga. Coastal Plain and Ga. Expt. Stas.). (*Jour. Hered., 34 (1943), No. 1, pp. 14–23, illus. 5*).—Male sterile plants resembling controlled hybrids between Vasey grass (*P. urvillei*) (*V*) and *P. malacophyllum* (*M*) were found among seedlings from a Vasey plant. When pollinated with *V* and Dallis grass (*P. dilatatum*) (*D*) pollen, these hybrids gave rise to $(V\times M)\times V$ hybrids, $(V\times M)\times D$ hybrids, and plants identical with the female $V\times M$ parent. Much hybrid vigor was shown in a test. In these hybrids varying degrees of dominance were observed in expression of characterictics—glabrous over hairy, mature leaf margins and blades, complete; presence of the second glume over its absence, partial; glabrous over hairy glumes, partial; yellow over partial red anther color, partial; purple over yellow and red anther color, complete; ergot resistance over susceptibility, complete in the $V\times M$ hybrids, partial in some $(V\times M)\times D$ hybrids; tolerance over intolerance of flooding, partial; and drought and heat tolerance as evidenced by ability to make good late summer and fall growth over intolerance, partial. No evidence of dominance was noted in the inheritance of hairiness of sheaths or margins of the first seedling leaf, spikelet shape, glume color, prominence of nerves on the fertile lemma, or resistance to frost injury. All of the *Paspalum* species hybrids in this test were highly sterile.

A cyto-taxonomic study of an intergeneric hybrid between Oryzopsis hymenoides and Stipa viridula, B. L. Johnson and G. A. Rogler. (Univ. Minn. and U. S. D. A.). (*Amer. Jour. Bot., 30 (1943), No. 1, pp. 49–56, illus. 40*).

Colchicine-produced polyploids in Gossypium.—I, An autotetraploid Asiatic cotton and certain of its hybrids with wild diploid species, S. G. Stephens (*Jour. Genet., 44 (1942), No. 2–3, pp. 272–295, illus. 18*).—The meiotic behavior of the tetraploid ($4n=52$) produced from a selfed strain (N 14) of the diploid Asiatic species (*G. arboreum neglectum*) by colchicine treatment, its fertility, crossing behavior with other species of *Gossypium*, and the cytology of some of its hybrids are considered, and comments made on the relation of induced polyploidy to practical cotton-breeding problems.

Self-incompatibility in certain diploid potato species, G. P. Carson and H. W. Howard (*Nature [London], 150 (1942), No. 3801, p 290*).—Four more species of *Solanum* are added to those which appear to be self-incompatible.

Studies on induced heteroploids of Nicotiana, H. H. Smith. (U. S. D. A.). (*Amer. Jour. Bot., 30 (1943), No. 2, pp. 121–130, illus. 33*).—Among *N. langsdorffii* ($2n=18$) plants affected permanently by colchicine treatment, 25 percent were offtype and found to be heteroploids with somatic chromosome numbers of 9 (a haploid), 17 ($2n$—1), 32, 33, 34, 35 ($4n$—1), and 72 (an octoploid). Of the F_1 of *N. langsdorffii*×*N. sanderae* ($2n=18$) plants similarly affected 26 percent were offtype, and included 3 F_1's minus 1 chromosome, 1 amphidiploid minus 3 chromosomes, and 3 amphidiploids minus 1 chromosome. In some aneuploids of the F_1 of this cross and its amphidiploid, the appearance of the corolla indicated from which parent the missing chromosome had come. In a polyploid series including $1n$, $2n$, $3n$, $4n$, and $8n$ forms of *N. langsdorffii* and a similar series (except for the haploid) of *N. sanderae* there was an increase in corolla tube width, ratio of leaf width to length, lateness of maturity, thickness of plant parts, and in size of cells throughout the plant with the addition of each chromosomal complement. Although general plant size and sturdiness was increased from haploid to tetraploid, the octoploids were less vigorous abnormal plants, revealing a considerable disorganization (described) of cells and tissues in the leaves. Cytological observations were made on meiotic chromosomes, sporads, and pollen of

N. langsdorffii heteroploids. The haploid typically had 9 univalents; the triploid 5 trivalents, 4 bivalents, and 4 univalents; and the tetraploid 2–5 quadrivalents and 2–4 univalents together with bivalent associations at first metaphase in the pollen mother cell. Nonbivalent chromosome associations in the tetraploid led to unequal distributions at anaphase and subsequent production of aberrant gametes. Among the progeny of tetraploids, 13–15 percent of aneuploids were found. In offspring of the haploid, $2n$—1, and 16-chromosomes forms of *N. langsdorffii* only $2n$ plants were found. Diads, microcytes, and pollen grains "larger than $2n$ size" were characteristic of all types with some nonbivalent chromosomes pairing.

A developmental analysis of the fruit in tetraploid as compared with diploid races of cucurbits, E. W. Sinnott and A. H. Franklin (*Amer. Jour. Bot., 30 (1943), No. 2, pp. 87–94, illus. 13*).—Five diploid lines (*Cucurbita* and *Lagenaria*) and five tetraploid lines derived from them by colchicine treatment were studied from early primordium to maturity. At the beginning of development the size of both cells and organ primordia was about twice as great in the tetraploids, and until about the time of flowering this size advantage was generally maintained. In the tetraploids cell division persisted in a given tissue to cell and ovary sizes about twice those in their diploid homologs. Between flowering and maturity the diploids overcame the lead of the tetraploids so that the volume of the mature fruit and of its constituent cells was about the same in both. In the details of developmental relationships between their diploid and tetraploid races, there were considerable differences among the five lines studied. It is suggested that in those polyploid series where no differences in cell size or organ size have been found at maturity between the tetraploid and diploid races, the early developmental stages should be analyzed to determine whether conditions there might not be the same as in the cucurbit lines here described.

The nature of polyploidy in Lilium tigrinum, R. N. Stewart and R. Bamford. (Univ. Md.). (*Amer. Jour. Bot., 30 (1943), No. 1, pp. 1–7, illus. 18*).—From studies of several clones of *L. tigrinum*, the authors conclude that this species and its varieties are allotriploids.

Cell-lineage studies in root meristems by means of chromosome rearrangements induced by X-rays, R. T. Brumfield (*Amer. Jour. Bot., 30 (1943), No. 2, pp. 101–110, illus. 18*).—Certain types of X-ray-induced chromosome rearrangements are passed on through subsequent cell divisions, but since the change is unlikely to occur in two adjacent cells such rearrangements offer a means of "tagging" a single cell and determining the tissues that it produces. This technic was used on primary root meristems in germinating seeds of *Crepis capillaris* and *Vicia faba*. During growth following irradiation the affected cells divided and produced new tissues. The period of growth was thought long enough for the whole meristem to have been replaced by descendants of initial cells present at the time of X-irradiation. After the growth period the primary root tips were examined cytologically. Study of chromosome morphology showed many of the roots to be chromosomal chimeras. Most of them were sectorial, and the aberrant karyotype was found in a wedge-shaped sector including root cap, epidermis, cortex, and central cylinder. In most of the chimeras the sectors with aberrant karyotype amounted to about one-third of the root. The findings suggest that the whole root develops from but few cells, possibly three, at the extreme tip of the root. These are arranged in such a way that sectorial chimeras are formed frequently, whereas periclinal ones are rarely if ever found. Sectorial chimeras would not be expected if the root meristem consisted of the "histogens" of Hanstein.

Progeny of 'Bennington' and 'Artemisia,' R. W. PHILLIPS and S. R. SPEELMAN. (U. S. D. A.). (*Vt. Horse and Bridle Trail Bul.*, *7* (*1943*), *No. 1*, *pp. 11–16*, *illus. 7*).—Accounts and photographs are given of the ancestors and descendants of Bennington and Artemisia, a Morgan stallion and mare.

Cellular antigens in cattle blood, C. STORMONT and R. W. CUMLEY. (Wis. Expt. Sta.). (*Jour. Hered.*, *34* (*1943*), *No. 2*, *pp. 35–41+*, *illus. 5*).—The steps necessary for the identification of the parentage of cattle by elimination are described. These are based on the 30 antigen characters previously described (E. S. R., 87, p 854). A pictorial presentation was given according to the methods of Cumley and Irwin (E. S. R., 86, p. 614) for two dove species to show the action of the antigens, antibodies, and complement.

The inheritance of fleece weights in range sheep, K. RASMUSSEN (*Sci. Agr.*, *23* (*1942*), *No. 2*, *pp. 104–116*).—By variance analysis, estimates of the heritability of fleece weights, based on intrayear and intrasire correlations in 196 Canadian Corriedale, 81 Rambouillet, and 282 Romney crossbred ewes born from 1930 to 1939, ranged from 0.14 for the additively hereditary variance in the daughter-dam Romney crossbreds to 0.72 in the Corriedale paternal half-sibs. Intrayear and intraclass correlations between the weights of fleeces from the same sheep averaged for 8 yr. in Corriedales 0.56, and given as the coefficient of repeatability were considered more correct than the correlation of 0.72. The size of the additively hereditary variance suggested that distinct improvement in fleece weight may be attained through selection.

The gestation period and the occurrence of multiple births, C. J. DALEY and R. EASTOE (*Agr. Gaz. N. S. Wales*, *54* (*1943*), *No. 2*, *pp. 75–78*, *illus. 5*).—The average gestation period of 101 hand-bred Dorset Horn ewes in Australia was 144.05 days, with 74.3 percent ranging from 142 to 145 days. Differences in the gestation periods of ewes of different ages were not significant. There were 32.2 percent of 97 ewes born from 1935 to 1940 which gave multiple births in the 1942 season. Nutrition and environmental conditions were influencing factors.

Experiments with inbreeding swine and sheep, L. M. WINTERS, R. E. COMSTOCK, R. E. HODGSON, O. M. KISER, P. S. JORDAN, and D. L. DAILEY. (Partly coop. U. S. D. A.). (*Minnesota Sta. Bul. 364* (*1943*), *pp. 39*, *illus. 13*).—In 5 years' inbreeding and selection experiments to establish inbred lines of swine and sheep relatively homozygous for characteristics of economic importance, there were produced at five substations eight lines of swine with inbreeding percentages of from 24 to 70. Although it was calculated that reductions in the number of pigs born alive and rate of gain were associated with increased inbreeding in the sows and pigs, it was shown that only animals superior in performance were selected as breeders. The result has been a general improvement in performance. It appeared that some differences in conformation, type, and manner of growth were exhibited by the individuals in different lines, but differences were not sufficiently great to permit separation of individuals. The inbreeding made selections more effective as a result of segregation of individuals for superior characters. Lines within Poland Chinas and crosses of Danish Landrace boars on Tamworth gilts were established.

Flocks initiated with 50 Shropshire ewes were carried at the North Central and Northwest Substations with purebred Shropshire rams but closed to outside blood except among themselves. The results obtained were similar to those with swine except that progress was slower.

Atropinesterase, a genetically determined enzyme in the rabbit, P. B. SAWIN and D. GLICK (*Natl. Acad. Sci. Proc.*, *29* (*1943*), *No. 2*, *pp. 55–59*).—The existence of racial differences in rabbit serum regarding the content of atropinesterase was demonstrated. Two families lacked the enzyme entirely. In three other families the enzyme was produced in from 50 to 75 percent of the animals. In crosses and inter se matings of the hybrids, the ability to produce the enzyme seemed to be dominant over its absence, but dominance was probably not complete. The enzyme was not present at birth, but first manifested itself at from 1 to 2 mo. of age. Females showed the enzyme more often and in greater concentration than males. The active enzyme which hydrolyzed atropine seemed to be the same as the one which hydrolyzed monoacetylmorphine. It was on the same chromosome as the gene *E* for the extension of black pigment in the coat.

Relation of certain endocrine glands to body weight in growing and mature guinea pigs, J. P. Mixner, A. J. Bergman, and C. W. Turner. (Mo. Expt. Sta.). (*Endocrinology, 32 (1943), No. 3, pp. 298–304, illus. 4*).—The pituitary, thyroid, adrenal, and gonad weights of 207 male and 146 female guinea pigs were plotted in relation to body weights. There was employed the relative growth equation: $Y=aX^b$, wherein Y equals the gland weight, a is a constant, and X is the body weight. These data are presented to serve as a possible standard of reference for body and gland weights.

The inheritance of egg production in the domestic fowl, I. M. Lerner and L. W. Taylor. (Univ. Calif.). (*Amer. Nat., 77 (1943), No. 769, pp. 119–132*).—Simple correlation coefficients for eight criteria of egg production and mortality of from 100 to 117 Single-Comb White Leghorn hens with their sires' sisters, their dams' sisters, and between the values of sire's sisters and dam's sisters showed the sisters of the parents to play a part in these determinations Except in persistency and the borderline case of winter pause, the total determinations of the sisters' effects on maturity, rate, viability, egg size, survivors' production, and production index were significant. In calculating the contributions through the sires and dams to the variability through correlations with the sires' and dams' sisters' egg records, the operation of sex-linked genes was suggested in case of maturity, survivors' production, and production index.

Egg production versus reproduction in Rhode Island Reds, F. A. Hays. (Mass. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 2, pp. 118–122*).—Among 243 Rhode Island Reds, with complete records of egg production for 2 laying years, the average first-year production of 256.73 eggs showed a correlation of +0.5426 ±0.0305 with the second year's production. Among the 339 birds on which fertlity records were available of at least 10 eggs laid in March and April of the second year, there was a correlation of only 0.0659±0.0365 between persistency and fertility. Many high-producing hens were inferior as breeders from the standpoint of fertility. The mean annual persistency of this group in the first year was 353.20 days, with ranges from 0 in 23 birds to 100 percent in 169 birds in fertility during the second year. A small negative correlation was obtained between fertility in the second year and production during the biological year, which extended from the first pullet egg to the time when laying stopped with the beginning of the annual molt. Although a high percentage of fertile eggs hatched, 82.09 percent, the correlation between annual persistency during the first year and hatchability was only +0.1155±0.0374. The correlation between the length of the biological year and subsequent hatchability was also essentially 0. Thus neither early nor late molting had any constant effect on hatchability.

Breeding for low fecundity in the fowl with the aid of the progeny test, W. F. Lamoreux, F. B. Hutt, and G. O. Hall. (Cornell Univ.). (*Poultry Sci., 22 (1943), No. 2, pp. 161–169, illus. 2*).—Twenty-two years of mass selection for low fecundity among limited numbers of White Leghorn hens failed to lower egg production appreciably. After 1934, with some exceptions, the breeding hens were selected from families of sisters which laid the smallest average number of eggs. The average annual egg production decreased from 103 in 1933 to 40 in 1940. With the decline in production, the age at first egg increased to a maximum of 352 days in 1940. The length of the laying period was also reduced. The coefficient of variation increased with the decline in production. The low production resulted not from a decrease in the rate of laying but from an increase in the age at maturity.

A study of body weights in nine different strains of White Leghorns, N. F. Waters and J. H. Bywaters. (U. S. D. A.). (*Poultry Sci., 22 (1943), No. 2, pp. 178–187, illus. 3*).—The monthly weights of 212 male and 336 female chicks in 9 different strains hatched at nine weekly intervals showed, by variance analysis, that the differences in growth rates up to 10 mo. of age were greater between strains than between hatching periods. At the same time significant differences in weight were obtained for the time of hatch. When the males of one strain ranked high in weights, the females of that strain usually ranked in the same order.

Genetics of the fowl, XVI, XVII, F. B. Hutt and C. D. Mueller. (Cornell Univ.). (*Amer. Nat., 77 (1943), Nos. 768, pp. 70–78; 769, pp. 181–184*).—Two further reports are given in continuation of the studies on new genes and chromosome mapping in the fowl (E. S. R., 87, p. 211).

XVI. *The linkage of polydactyly with multiple spurs and duplex comb in the fowl.*—The arrangement of these genes and the approximate cross-over distances are *D* 28 *M* 33 *Po*. *D* and *Po* showed 42 percent crossing over, and there were 9.3 percent double cross-overs between them. Inhibiting genes affecting the expression of *M* and *Po* somewhat complicated the determination of crossing over, but it seemed quite clear that *D* and *Po* were at the opposite extremes of the chromosome and apparently independent of the four other autosomal linkage groups. The determinations were made by backcrossing heterozygotes with double recessives, with the production of 514 progeny.

XVII. *Independent identical mutations to albinism in the sex chromosome of the fowl.*—Three mutations for albinism (two in Barred Plymouth Rock and one in White Leghorn females) presumably arose independently. On suitable breeding tests, they were found to be identical. Thus albinism in the fowl was caused by the sex-linked gene *al* (E. S. R., 85, p. 329).

Identification of chick embryos homozygous for the creeper factor, J. M. Cairns and K. Gayer (*Jour. Expt. Zool., 92 (1943), No. 2, pp. 229–245, illus. 11*).—Continuing and confirming observations on the development of lethal creeper embryos (E. S. R., 86, p. 767), there were found in 454 fertile eggs, examined in 1942, 2 embryos classified as phocomelic when candled after from 3 to 4 days' incubation. Of this group, there were 313 classified as normal, 27 doubtful and abnormal, and 112 prothanic. The extent of prothanic deficiency was apparent at 72 hr. Phocomelic embryos were identified at from 6 to 8 days' incubation with typical coloboma, and at 8.5 days' incubation or older with certain skeletal abnormalities. A 1-day gap remained between the elapsed relatively healthy prothanic embryos and the youngest phocomelic embryo yet identified.

Five years of selection for viability in White Leghorn chickens, P. D. Sturkie. (Ala. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 2, pp. 155–160*).—By selection for viability and egg production, the mortality during the first year was reduced from 89 percent in 1935 to 27 percent in 1940. The average egg production per bird completing the year decreased from 213 in 1935 to 205 in 1940. During this period 11 percent finished the laying year in 1935 and 73 percent in 1940. The survival age of the pullets dying was also increased. The average weight of the eggs laid in 1940 was 59.4 gm. Of 446 pullets of the disease-resistant strain placed in the laying house in 1940, 418 were descendants of 4 dams. Leucosis caused over two-thirds of the deaths in 1935 and 1936 but less than 14 percent in 1940.

Changes in the whole vagina of the mouse during estrus and pregnancy, R. D. SCHICK. (Ohio State Univ. et al.). (*Jour. Morphol., 72 (1943), No. 2, pp. 305–329, illus. 22*).—Changes in weight, circumference, percentage of water, and mitoses in the vagina of mice during oestrus, pregnancy, and pseudopregnancy are described. Early gestational changes in pregnancy or pseudopregnancy following copulation involved proliferation and mucification of the epithelial cells. In late pregnancy there was an increase in the vaginal weight and amount of water, with loosening of the connective tissue and increased vascularization of the vaginal wall.

Relation between ovarian function and avidin content in the oviduct of the hen, R. M. FRAPS, R. HERTZ, and W. H. SEBRELL. (U. S. D. A. et al.). (*Soc. Expt. Biol. and Med. Proc., 52 (1943), No. 2, pp. 140–142*).—Avidin production seemed to be associated with complete reproductive function of the ovary. In 21 laying hens, assays for avidin by inhibition of yeast growth showed that the raw egg white factor was present at all levels of the magnum, but it did not occur in the isthmus or uterus or the atropic magna of 10 nonlaying hens.

Induction of avidin formation in the avian oviduct by stilbestrol plus progesterone, R. HERTZ, R. M. FRAPS, and W. H. SEBRELL. (U. S. D. A. et al.). (*Soc. Expt. Biol. and Med. Proc., 52 (1943), No 2, pp. 142–144*).—The injection of stilboestrol followed by progesterone into immature chickens or nonlaying hens proved effective in inducing avidin formation in the magnum of every bird so treated. Only 3 of 61 immature chickens and only 4 of 29 nonlaying hens treated with stilboestrol alone showed avidin formation. The oviducts of all control birds and of those receiving progesterone alone were negative. The elaboration of avidin is regarded as one more reaction depending on the synergistic action of follicular and luteal hormones. The study was conducted with 122 immature chickens from 4 to 14 weeks of age and 35 nonlaying hens. The control birds were untreated or given oil alone.

Effect of hypophysectomy and of purified pituitary hormones on the liver arginase activity of rats, H. FRAENKEL-CONRAT, M. E. SIMPSON, and H. M. EVANS. (Univ. Calif. et al.). (*Amer. Jour. Physiol., 138 (1943), No. 3, pp. 439–449*).—Hypophysectomy or adrenalectomy of rats was shown to decrease markedly the arginase activity of the livers. Of several purified pituitary hormones administered to hypophysectomized rats, adrenocorticotropic hormone was the only one that increased the arginase activity. The growth, thyrotropic, follicle-stimulating, and interstitial cell-stimulating hormones decreased the arginase content of the liver. Different amounts of the hormones were employed with groups of 3 to 8 rats for varying numbers of treatments.

Progonadotropic and aspecific effects of the serum of a horse immunized with extracts of sheep pituitary glands, H. N. MARVIN and R. K. MEYER. (Univ. Wis.). (*Endocrinology, 32 (1943), No. 3, pp. 271–278*).—Repeated injections of a horse with an extract of sheep pituitary glands produced in the serum a substance which augmented the gonadotropic action of an extract of sheep pituitary given to immature rats. After 107 days' injection of the horse, serum inhibited the gonadotropic action of extracts of the pituitary from sheep, rats, beef, and humans and the serum of pregnant mares administered concomitantly to rats. However, the serum failed to inhibit gonadotropic activity of extracts of horse, hog, and chicken pituitaries. No antithyrotropic substance was produced.

The value of artificial insemination in poultry breeding work, D. C. Warren and C. L. Gish. (Kans. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 2, pp. 108–117*).—With a single exception among 116 chicks hatched from eggs laid through the first day after insemination by another male, the chicks were from inseminations made 1 week previously. Similar results were obtained in 1940, 1941, and 1942. Rhode Island Red and Barred Plymouth Rock hens and males of these breeds were rotated at weekly intervals with the former, and Barred Plymouth Rock and White Leghorn males with the latter in 1940. In 1941 and 1942 Rhode Island Red females were inseminated at weekly intervals with semen from Rhode Island Red, Barred Plymouth Rock, and White Leghorn males. The paternity of the chicks was identified by the color of their plumage. Freshness of semen was shown to be a factor when two different males were in competition. A study of the effects of differences in the periods between insemination classed as 0, 2 to 4, and 7 days led to this conclusion. When immediately inseminated with semen from a second breed, the chicks had about an equal chance of being sired by either male. When the interval between matings was increased to 3 days, greater percentages were sired by the second male, and when the interval was increased to 7 days over 90 percent of the progeny were sired by the second male. In another study, freshly used semen gave 73 percent fertility; semen held 24 hr. at from 50° to 60° F. was 6 percent fertile; and mixed fresh semen from several males held 24 hr. gave fertility of 28 percent. Fertility was very low or practically 0 in semen held at 32° or 80° for 7 hr., but there were good results when held at 50°.

In another test with 28 mature males, there was little difference in the yield of semen obtained at 0.5- and 8-hr. intervals. In studies for the most favorable time for insemination with 27 laying pullets, the smallest number was found with shelled eggs at 3 p. m. As to frequency of insemination, the authors recommended oftener than weekly intervals. The advantage of several females for progeny testing each male is emphasized, based on knowledge of the time interval for fertilization.

Influence of feed restriction on fertility in male domestic fowls, J. E. Parker and B. J. McSpadden. (Tenn. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 2, pp. 170–177, illus. 2*).—The semen volume, number of spermatozoa per collection, and fertilizing capacity of Rhode Island Red males were reduced when the feed consumption was limited to from 42 to 72 percent of the amounts consumed by other comparable males fed ad libitum on an all-mash ration. With 7 months' restricted feeding, the amounts of semen and numbers of spermatozoa were gradually reduced in the semimonthly ejaculations. There were individual variations in the reactions to feed restriction, but after 6 mo. sperm production had declined with feed limitation to 9 percent of that by the ad libitum fed males. The fertilizing capacity of the semen declined with the restricted ration. The comb and testes were also reduced in size. The study was conducted with nine male birds maintained and fed ad libitum in batteries, with the semen samples for artificial insemination collected twice monthly. The experimental birds were restricted to 42, 57, 59, 66, 68, and 72 percent of the amounts of feed consumed ad libitum by the control birds. Two hens were artificially inseminated at each collection from each male.

Seasonal variation in semen production in domestic fowls, J. E. Parker and B. J. McSpadden. (Tenn. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 2,, pp 142–147, illus. 1*).—The peak in semen production by 12 Rhode Island Red cockerels kept in individual cages with collections twice each month was reached in April and May. The mean number of spermatozoa produced per male increased from 1.44 billion in mid-December to 3.49 billion in April, after which there was a gradual decline to the middle of July with a slight increase, followed by a further decline through the rest of the year. There was indication that fertility of eggs decreased with artificial insemination when less than 1 million sperm were employed. Pullets were more easily fertilized than hens.

Effect of sex hormones on the erythrocyte number in the blood of the domestic fowl, E. Taber, D. E. Davis, and L. V. Domm (*Amer. Jour. Physiol., 138 (1943), No. 3, pp. 479–487*).—Determination of erythrocyte counts in normal males, females, capons, and sinistrally and bilaterally ovariectomized poulards showed that the counts were increased, in general, by male hormones and decreased by oestrogen. The oestrogen injections during incubation did not modify the erythrocyte counts from controls, although feminization of the plumage was noted. There were no significant differences in the blood count during molt. The cell counts of the blood of juvenile birds injected with pregnant mare serum were higher than their controls.

Diagnosis of pregnancy in the mare by hormonal means, H. H. Cole and G. H. Hart. (Univ. Calif.). (*Jour. Amer. Vet. Med. Assoc., 101 (1942), No. 785, pp. 124–128, illus. 2*).—The procedures for the diagnosis of pregnancy in the mare are reviewed, with special attention to the 48-hr. immature rat test with mare serum (E. S. R., 86, p. 464) and reading the result with the uterine and ovarian growths. The best results are obtained when serum from mares pregnant 45–140 days is employed. Comparison is also made with the chemical test of pregnant mare urine and the rabbit ovulation test.

Hormonal requirements for pregnancy and mammary development in hypophysectomized rats, W. R. Lyons, M. E. Simpson, and H. M. Evans. (Univ. Calif.). (*Soc. Expt. Biol. and Med. Proc., 52 (1943), No. 2, pp. 134–136*).—Successful implantation was induced in 24 rats bred and hypophysectomized by daily subcutaneous doses of 2 or 4 mg. of purified lactogenic hormone and 1 μg. of oestrone, but singly neither of these hormones permitted implantation. Only about half of the implantations were developed normally through mid-pregnancy, thus the two substances did not adequately substitute for the intact pituitary. The double dose of the lactogenic hormone was no more efficacious than doses of 2 mg.

Non-specific results obtained with micro-method for assay of prolactin, E. L. Lahr, R. W. Bates, and O. Riddle (*Endocrinology, 32 (1943), No. 3, pp. 251–259*).—Many organic substances and even injury gave positive responses in the crop-sac epithelium through intradermal injections for various periods. The sensitivity of the microtest for prolactin made necessary taking account of these effects in the conduct of this test.

Initiation and maintenance of lactation in dairy heifers by hormone administration, R. P. Reece. (N. J. Expt. Stas.). (*Soc. Expt. Biol. and Med. Proc., 52 (1943), No. 2, pp. 145–146*).—Lactation was initiated in two nulliparous heifers by subcutaneous injections of diethylstilboestrol dipropionate, followed in one heifer for a short time by testosterone propionate. Lactation was continued with injections of diethylstilboestrol.

The normal development of the ovary of the opossum from birth to maturity and its reactions to sex hormones, C. F. Morgan (*Jour. Morphol., 72 (1943), No. 1, pp. 27–85, illus. 22*).—A description is given of the development of opossum ovaries from birth to maturity, with consideration of the responses to treatments with androgens, oestrogens, and gonadotropins during various ages and phases of growth. A study was made of serial sections of the ovaries of 64 females from 1 to 100 days of age and 39 juvenile and adult females. Part of these groups were untreated, while others received doses of the different hormones by inunction at the younger ages or subsequent injections at later ages. Growth of the ovaries was most rapid from the thirty-first to the forty-fourth day of age. Sex hormones and gonadotropic hormones were not effective on the young until after about 100 days of age. In juvenile and anoestrous adults (June to February), oestrogens and androgens caused increased atresia of follicles and germinal cells of the ovary. An extensive bibliography is included.

Stimulation of mammary glands in hypophysectomized rats by estrogen and testosterone, S. L. Leonard. (Cornell Univ.). (*Endocrinology, 32 (1943), No. 3, pp. 229–237, illus. 5*).—Oestradiol propionate injections of from 45 to 1,150 µg. for from 10 to 12 days into hypophysectomized rats showed that growth of the mammary gland end buds was stimulated if the rat weighed less than 70 gm. at hypophysectomy, but no stimulation of the mammary growth occurred in animals heavier than this weight at the operation. Daily injections of about 10 mg. of testosterone propionate for 10 days were found to cause thickening of the ducts of the mammary tree of immature hypophysectomized rats. Positive results were also obtained with menopause urine injections. In these studies, there were employed about 10 or more male rats with immediate and delayed treatment of each hormone.

FIELD CROPS

[Farm crops research in Mississippi] (*Miss. Farm Res. [Mississippi Sta.], 6 (1943), No. 3, pp. 1–6, 7, illus. 6*).—Findings of current interest in agronomic experiments are reported in articles entitled Efficiency of Varieties of Soybeans Grown for Grain Measured in Delta Tests (pp. 1, 7), and Yields of Cotton in Tests of 16 Varieties at Six Locations, Mississippi-Yazoo Delta (p. 2), both by H. A. York: Peanuts for Oil—A War Goal Crop, by P. S. McComas, J. F. O'Kelly, and F. J. Welch pp. 3–6) (E. S. R., 89, p. 61); and Early Turning of Winter Legumes Favorable to Succeeding Crops of Cotton and Corn, by C. D. Hoover (p. 7).

An ecological and grazing capacity study of the native grass pastures in southern Alberta, Saskatchewan, and Manitoba, S. E. Clarke and J. A. and J. B. Campbell (*Canada [Dept. Agr.] Pub. 738 (1942), pp. 31, illus. 11*).

Fiber of native plants in New Mexico, C. W. Botkin, L. B. Shires, and E. C. Smith (*New Mexico Sta. Bul. 300 (1943), pp. 38, illus. 14*).—In a survey on the distribution and yield of native fiber plants in New Mexico, *Yucca glauca, Y. elata*, and nolina (beargrass) were found in sufficient concentration (shown on outline map) to provide a commercial source of hard fiber during the national emergency. These plants lost over 40 percent of moisture on air drying and were found to contain, respectively, averages of 42.3, 43.0, and 48.5 percent of crude fiber on a moisture-free basis. Their ash and protein contents were determined, and similar data are given for *Y. baccata, Y. macrocarpa, Agave lechuguilla*, and sotol (*Dasylirion* sp.).

Fiber extraction processes were more effective on green leaves of *Y. glauca, Y. elata*, and nolina than on the air-dry material, but in either condition yucca leaves yielded a satisfactory fiber by retting or by cooking with pressure steam supplemented with mechanical treatment. Nolina fiber, harder to separate, was freed by autoclaving with a 2-percent solution of soda ash. The average tensile strength (the minimum length of a fiber in kilometers that would break under its own weight) was for *Y. glauca* 47 km., *Y. elata* 45, and for nolina 33 km. The yucca fibers were equal to hemp and Manila (hemp) fibers in strength and were stronger than those of nolina, which about equaled sisal, jute, sansevieria, and raw silk fiber, but were stronger than henequen, cotton, and linen fibers.

The comparative performance of alfalfa varieties in nursery and field plots in irrigated soil infested with Phytomonas insidiosa, R. M. Weihing and D. W. Robertson. (Colo. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943),* *No. 2, pp. 125–136).*—Data obtained in further studies (E. S. R., 85, p. 339) indicated that the first year after seeding several types of nursery plats appeared reliable for predicting field performances of alfalfa varieties, but after 3 yr. of harvesting only the middle row, the three middle rows, and the five rows of the five-row plats were still reliable. Varietal characteristics, as spring and fall growth and susceptibility to mildew and leaf spots, appeared relatively the same in most types of nursery plats and the field plats. In general, data from nursery plats of five rows 12 in. apart with 20-in. side alleys corresponded most closely to that from field plats. The use of the following types of nursery plats is recommended for predicting yield and other agronomic characteristics of alfalfa grown under irrigation: Five-row plats with rows 12 in. apart and 20-in. alleys, the three center rows of a five-row plat with rows 12 in. apart and 20-in. alleys, and the middle row of the five-row plats. The five-row plat can be handled with machinery and no border rows need be removed. At least five replications should be used.

Barley varieties registered, VII, VIII, H. K. Hayes. (Univ. Minn.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 3, pp. 281–282; 35 (1943), No. 3, p. 240).*—The four additional varieties approved for registration (E. S. R., 86, p. 182) included Beecher, a six-rowed, smooth-awned, dry-land barley with erect spikes, derived from Atlas × Vaughn; Lico, a stiff-strawed, six-rowed, smooth-awned variety with erect spikes, produced from Coast × Lion; Texan, a six-rowed, smooth-awned barley, intermediate in growth habit and producing from either fall or spring planting under Texas conditions, resistant to mildew, and derived from a selection from Composite Cross (C. I. 5530) winter barley; and Santiam, another selection from Composite Cross C. I. 5530, winter hardy and productive under western Oregon conditions, six-rowed, white, rough awned, with hulled kernels and long-haired rachilla.

The chemical composition of commercial hybrid and open-pollinated varieties of dent corn and its relation to soil, season, and degree of maturity (a preliminary report), D. M. Doty, M. S. Bergdoll, and S. R. Miles. (Ind. Expt. Sta.). (*Cereal Chem., 20 (1943), No. 1, pp. 113–120, illus. 3).*—As corn ripened, the percentages of protein, fiber, and ash in the grain decreased and then remained constant, while the fat percentage increased and then remained constant or decreased slightly. These changes occurred in three hybrids in all seasons, 1938–40. The protein and fat contents of corn grain were influenced by seasonal variations, and protein content was also affected by soil type and location. No significant differences were noted in the chemical composition of more than 40 commercial hybrids and open-pollinated varieties, and the composition of yellow varieties resembled that of white corns grown under the same field conditions.

Kansas corn tests, 1942, R. W. Jugenheimer, A. L. Clapp, and H. D. Hollembeak. (Coop. U. S. D. A.). (*Kansas Sta. Bul. 311 (1943), pp. 44, illus. 1).*—Tests of corn hybrids and varieties under the Kansas corn testing program (E. S. R., 87, p. 663) were made again in 1942. Hybrids standing up as well as the average of the better open-pollinated varieties and producing at least 10 percent more grain in fields in all three eastern districts in 1942 were Funk G–149, Kansas 2234 and 1585, and Funk G–150, and in the northeastern and east-central districts during the period 1939–42 were Funk G–94, U. S. 35 and 13, KK–77, and Pioneer 307. Yields of hybrids and varieties in cooperative strip tests are also reported. Results usually will be more satisfactory if the acreage is planted to several tested hybrids of differing maturity instead of only one. Using different hybrids in each planter box is usually a desirable practice. Planting should be spread over several weeks or a month.

Registration of improved cotton varieties, III, H. B. Brown. (U. S. D. A., La. Expt. Sta., et al.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 3, p 241*).—Bobshaw, formerly known as Stoneville A–61–7, originated from a plant selection in a field of Stoneville cotton, was approved for registration (E. S. R., 83, p. 53). Characteristics and adaptations are described briefly.

Station Miller cotton, H. B. Brown (*Louisiana Sta. Cir. 29 (1943), pp. 7*).—The strain of Station Miller cotton currently grown, according to test results, is a relatively good producer, has a medium large boll (60–65 per pound of seed cotton), is a good picking cotton with staple length from 31/32 to 1 1/32 in. and lint percentage 34–37, and considerable wilt tolerance, and the seed has a high oil content. Data on fiber characters indicate spinning qualities satisfactory for a short-staple cotton. It is considered desirable for hill lands in north Louisiana.

The staple length of cotton, E. Lord (*Jour. Textile Inst., 33 (1942), No. 12, pp. T205–T240, illus. 12*) —A report on a study of the relationship between lengths of staple as measured by official cotton standards of the U. S. Department of Agriculture, hand stapling tests by brokers and spinners in Great Britain, and by the sorter diagram method used in the laboratory.

Studies in oil formation in the V.135 and M. S. I. varieties of sea island cotton in St. Vincent, B. W. I., C. C. Seale (*Trop. Agr. [Trinidad], 19 (1942), No. 11, pp. 210–214, illus. 1*).

Registration of varieties and strains of oats, XI, XII, T. R. Stanton. (U. S. D. A. et al.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 3, pp. 275–279; 35 (1943), No. 3, pp. 242–244*).—Oats varieties approved for registration (E. S. R., 86, p. 183) and described with performance records included Otoe, derived from Burt, an early red oats; Tama, derived from Victoria × Richland, an early yellow oats; Marida, derived from Markton × Idamine, an early to midseason white variety; DeSoto, derived from Lee × Victoria, a midseason yellow oats; and Bridger, originated from Markton × Victory, a midseason white oats.

The accumulation of nitrates in oat straw, J. L. Doughty and F. G. Warder (*Sci. Agr., 23 (1942), No. 4, pp. 233–236*).—The nitrate content of oat straw was increased by application of KNO_3 and by drought during heading and ripening. Crops grown on summer-fallow land contained more total and nitrate N than crops grown on stubble land. Analyses indicated that nitrate in straw was combined with K. Wheat straws examined were relatively low in nitrate.

Relation of field plot design to seed-source tests of Irish potatoes in the South, E. L. LeClerg. (U. S. D. A. coop. La. Expt. Sta.). (*Amer. Potato Jour., 19 (1942), No. 4, pp. 75–79*).—Lattice and triple lattice designs appear suitable for seed-source tests where many lots are to be tested and also when the soil is very heterogeneous. Superiority of the lattice design over a randomized block arrangement has been noted (E. S. R., 84, p. 320).

Relative response of several varieties of potatoes to progressively changing temperatures and photoperiods controlled to simulate "northern" and "southern" conditions, H. O. Werner. (Nebr. Expt. Sta.). (*Amer. Potato Jour., 19 (1942), No. 2, pp. 30–40, illus. 2*).—With the Triumph (T12) and Warba, early; Irish Cobbler and Chippewa, intermediate; and Triumph (T23), Katahdin, and Russet Rural, late, potato varieties tested under northern conditions (E. S. R., 85, p. 187) in contrast with southern conditions, maximum vegetative growth was greater and continued later, stolon growth was much more extensive, tubers developed later and in greater numbers with greater total weight, but ratios of weight of tubers: weight of tops were lower. Early varieties could develop larger vines and more tuber weight early in the season under northern conditions while days were still hot and long than could late varieties, which responded better to the cool short days late in the season The northern type of environment permitted the manifestation of more varietal differences than did the southern type. When tuberization efficiency was judged by ratios of green weights of tubers: tops, early varieties appeared more efficient than the late ones under both conditions. Stolon growth and numbers of tubers set were increased to a very much greater extent under northern than under southern conditions with the Triumph than with any other variety.

The performance of certain potato varieties in South Carolina in 1942, J. M. Jenkins, Jr. (S. C. Expt. Sta.). (*Amer. Potato Jour., 19 (1942), No. 10, pp. 213–216*).—Current tests in the Charleston area suggest Irish Cobbler and Katahdin as the best white-skinned potato varieties, Pontiac as the most prolific red type, and Bliss Triumph for earliest red potatoes.

Newer potato varieties can be produced with less labor and expense than some of the old, F. J. Stevenson and R. V. Akeley. (U. S. D. A.). (*Amer. Potato Jour., 19 (1942), No. 8, pp. 153–161*).—Varieties made available during recent years include Earlaine, Mesaba, Nittany Cobbler, Red Warba, and Warba early potatoes, and Katahdin, Chippewa, Houma, Earlaine 2, Golden, Pennigan, Pontiac, Sebago, and Sequoia late varieties. Because of resistance to various diseases and insects, some of these produce satisfactory crops with less labor and spray materials than the standard varieties. Certain ones, as Katahdin, are widely adapted, while others are perhaps more limited in adaptation. Important characteristics are mentioned, and a table summarizes production of certified seed of new and standard varieties in 1941.

Comparison of Katahdin potato pollen produced in the field and in the greenhouse, W. C. Edmundson. (U. S. D. A.). (*Amer. Potato Jour., 19 (1942), No. 1, pp. 12–15, illus. 1*).—Open blossoms averaged 75 percent of stainable pollen and advanced buds 70 percent in the greenhouse and 67 and 64 percent, respectively, in the field, both at Greeley, Colo., and 72 percent each in the field at Estes Park. Differences were significant but not enough to influence fertilization after pollination.

Some possibilities of the Irish potato in north Alabama, L. M. Ware and H. M. Darling. (Ala. Expt. Sta. et al.). (*Amer. Potato Jour., 19 (1942), No. 3, pp. 48–59*).—Tests in different localities, 1937–40, with Triumph potatoes demonstrated the merits of seed spring-grown in south Alabama for the north Alabama fall crop and the value of the latter as seed for the general crop in its own region and for the commercial spring crop of south Alabama.

Value of the Alabama potato seed-testing program, L. M. Ware and H. M. Darling. (Ala. Expt. Sta.). (*Amer. Potato Jour., 19 (1942), No. 10, pp. 216–223*).—Objectives and provisions of the program are reviewed, and its benefits are summarized.

Performance of Irish potato varieties in Louisiana, E. L. LeClerg. (Coop. U. S. D. A.). (*Louisiana Sta. Bul. 359 (1943), pp. 10*).—Yield tests with both new and older potato varieties at four locations, 1940–42, showed that among the five early-maturing red varieties, Red Warba yielded at least twice as many bushels per acre as Triumph at each location and produced about 20 percent more No. 1 tubers. Red Warba is as early as Triumph and has resistance to mild mosaic. Katahdin, the highest yielding of seven late white varieties, equaled or surpassed the other varieties in percentage of No. 1 tubers.

The Kasota potato, F. A. Krantz, A. G. Tolaas, H. O. Werner, H. W. Goss, and J. H. Jensen. (Minn. and Nebr. Expt. Stas.). (*Amer. Potato Jour., 20 (1943), No. 2, pp. 25–27*).—Derived from a cross between a seedling selection 29–13 and Triumph, made at the Minnesota Station in 1933, the Kasota potato has broadly roundish, smooth, medium red tubers maturing midseason; resembles Triumph in cooking quality; has shown resistance to *Fusarium* wilt; is heat enduring; and appears well adapted to locations favorable to a midseason variety.

A comparison of stands and yields from seed pieces cut from the apical and stem ends of Irish Cobbler, Russet Rural, and Chippewa potatoes, N. K. Ellis. (Purdue Univ.). (*Amer. Soc. Hort. Sci. Proc., 40 (1942), pp. 516–518*).—Yields of No. 1 tubers on muck soil from seed cut from apical and stem ends, respectively, were from Irish Cobbler 362.0 and 340.7 bu. per acre, Russet Rural 270.8 and 218.7, and Chippewa 259.4 and 132.0 bu. Hills from stem ends, especially of Chippewa, emerged more slowly than of apical ends. The data suggested a difference between varieties in reaction to apical dominance of seed pieces.

Studies on the association of heat sprouting with rest period and maturing time in Irish potatoes, E. L. LeClerg and M. T. Henderson. (U. S. D. A. coop. La. Expt. Sta.). (*Amer. Potato Jour., 20 (1943), No. 2, pp. 28–33, illus. 1*).—Heat sprouting, often occurring in potatoes in the warmer portions of many Southern States, is the growth of tuber buds (usually apical buds) prior to harvesting, and seems due to a combination of high soil temperature and low soil moisture. Presence of heat sprouts as studied in crossed, inbred, and open-pollinated material was found in inverse ratio to the relative length of rest period, and was greatest in association with a short rest period and least with a long rest period. Heat sprouting was found oftenest in late-maturing plants, plants intermediate in maturing were intermediate in this respect, while tubers from early-maturing segregates seldom formed heat sprouts.

The age of maximum reproduction vigor in Irish Cobbler seed potatoes, J. Bushnell. (Ohio Expt. Sta.). (*Amer. Potato Jour., 19 (1942), No. 6, pp. 124–129*).—Irish Cobbler seed potatoes found best for planting on April 1 in Washington County, Ohio, were from lots planted during the preceding May or early June, i. e., from 10 to 11 mo. after the seed crop was planted. This also held for Russet Rural. The data, 1933–41, indicated that maximum productivity is at the stage where 1.5-oz. seed pieces usually produce from two to three sprouts. The spring crop of northern Ohio, grown from certified seed, proved very suitable for early planting in southern Ohio.

Effect of date and depth of planting on yield of Irish Cobbler potatoes, W. C. Barnes. (S. C. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 40 (1942), pp. 513–515, illus. 1*).—Planting tests, 1939–41, at Charleston suggest that potatoes planted February 1–14 in South Carolina coastal vegetable sections may outyield those planted February 15–28. Seed should be planted in a furrow about 2 in. deep and covered as usual. Marked response to time of planting was associated with incidence of rainfall and high temperatures.

Flower bud formation in the potato plant as influenced by variety, size of seed piece, and light, A. E. Clarke and P. M. Lombard. (U. S. D. A.). (*Amer. Potato Jour., 19 (1942), No. 5, pp. 97–105, illus. 1*).—The number of young buds developing in the first inflorescence of the potato was influenced by variety, size of seed piece, and light treatment. The mean number of buds per plant in the first inflorescence of 27 varieties ranged from 22.0 for British Queen and Spaulding Rose to 13.9 for Pearl. Fewer buds were initiated in plants from 5-gm. seed pieces than from 25- and 45-gm. pieces and from plants grown in total darkness than in plants exposed to natural daylight. The number of buds differentiated was not increased by prolonging the natural photoperiod with Mazda light of low intensity. An increase significant to the 1-percent level was obtained from two collections made in dull, cloudy weather by lengthening the natural photoperiod with fluorescent light of higher intensity. Favorable effects of long photoperiod with high light intensity on flower production seemed to result chiefly from reduction in bud abscission.

Effect of number of plants per hill on the yield of potatoes in Ohio, J. Bushnell. (Ohio Expt. Sta.). (*Amer. Potato Jour., 19 (1942), No. 6, pp. 119–123, illus. 1*).—Irish Cobbler potatoes in Washington County, Ohio, experiments in hills 1 ft. apart made highest yields of tubers over 1⅞ in. diameter with from two to four plants per hill.

Potato fertilizer-rotation studies on Aroostook Farm, 1927–1941, J. A. Chucka, A. Hawkins, and B. E. Brown. (Coop. U. S. D. A.). (*Maine Sta. Bul. 414 (1943), pp. 103–189, illus. 22*).—In permanent plats on Caribou loam, the use of 2,000 lb. per acre of a 4–8–7 fertilizer per crop of Green Mountain potatoes, 1930–41, resulted in average acre yields of 383, 404, and 351 bu., respectively, for the 3-yr. (oats, clover, potatoes), 2-yr. (green manure, potatoes), and continuous potato series. Plats unfertilized, 1930–41, averaged 123 bu. per acre, while plats receiving 2,000 lb. of 4–8–7 fertilizer produced 381 bu. Increasing quantities of fertilizer (from 1,500 to 3,000 lb.) resulted in progressively larger yields. The importance of adding organic matter in addition to chemical fertilizers was demonstrated. On the 2-yr. rotation series over 13 yr. potatoes averaged 370 bu. where green manure was cut and removed, 410 bu. where it was plowed under, 437 bu. where green manure and 6 tons of straw were plowed under, and 456 bu. where 20 tons of manure was plowed under also. Twenty tons of manure added to continuous potatoes raised the yield, 1930–41, from 351 to 454 bu. per acre. Formula comparisons suggested that potato fertilizers in Aroostook County should supply about 100 lb. each of N and phosphoric acid and about 200 lb. of potash per acre, which might produce around 400 bu. of potatoes under normal weather conditions. A rather good correlation was observed between yield and percent U. S. No. 1 grade. Fertilizer treatments producing low yields also resulted in a low percentage of large-sized potatoes, especially the 4–8–0 and no-fertilizer treatments.

In general, mixtures deriving N from two or more carriers outyielded fertilizers with only one N source. KCl and K_2SO_4 proved equally effective as sources of K on yields in amounts used, although tubers fertilized with K_2SO_4 had the higher starch and total dry matter contents. Thus far in minor-element studies started in 1936, only Mg deficiency has been observed on plats receiving pure salt mixtures supplying N, P, and K, and yields have been only slightly lower than with comparable amounts of nutrients from regular fertilizers. Certain of the better high-analysis mixtures produced yields in 2- and 3-yr. rotations which compared favorably with yields produced by standard 4-8-7 mixtures. In studies begun in 1938, thus far acid fertilizers had produced yields as high as the same mixtures neutralized by either high Ca or dolomitic limestone.

Potato yields tended to rise with increasing rainfall and to fall with increasing temperatures. Subnormal rainfall during July and August, the so-called "critical" months, coupled with high temperatures resulted in low yields. Climatological data are appended. Yield data presented for oats, clover, and green manures used in the rotations are grouped to show residual effects of fertilizers used on potatoes.

Potato fertilizer and nutrition studies in 1940, O. Smith. (Cornell Univ.). (*Amer. Potato Jour., 18 (1941), No. 12, pp. 333–348*).—Results of investigations published in 1940 and late in 1939 on fertilizers, green manures, cover crops, rotations, soil reaction, soil fertility, and sand and solution cultures with the potato are summarized, with a list of 64 titles.

Fertilizer and nutrition studies with the potato in 1941, O. Smith. (Cornell Univ.). (*Amer. Potato Jour., 19 (1942), No. 6, pp. 108–118*).—The review covers 57 references.

Effect of different sources of phosphorus on the production of potatoes on Long Island, R. H. White-Stevens. (Cornell Univ.). (*Amer. Potato Jour., 19 (1942), No. 5, pp. 81–90*).—Comparative tests, 1939–40, with Irish Cobbler and Green Mountain potatoes on Sassafras silt loam (pH 5.3–5.5 at the start of the experiments) indicate that superphosphate, Nitrophoska, soft (colloidal) phosphate, potassium metaphosphate, and monocalcium chlorophosphate were equally efficient in providing adequate P to potatoes. Ammo-Phos, presumably because of its active residual acid effect, seemed not so suitable on low reaction potato soils. The behavior of the P carriers in several placements is commented on.

Potato quality, IV, VI. (Cornell Univ.). (*Amer. Potato Jour., 18 (1941), No. 4, pp. 91–99; 19 (1942), No. 11, pp. 229–254*).—Further studies in this series (E. S. R., 86, p. 38) are presented.

IV. *Relation of variety and environmental condition to partial composition and cooking quality*, L. B. Nash.—Green Mountain and Pioneer Rural were found to be mealier than the other 8 of 10 varieties tested in four counties in New York State, while Pontiac, Chippewa, and Earlaine were usually the least mealy. All varieties grown in Tompkins and Steuben Counties matured much later and under conditions of lower temperatures, suggesting why tubers from those regions are mealier than those from Suffolk and Wayne Counties. An inverse relationship between mealiness and blackening was apparent. The mealiest varieties also showed most blackening.

VI. *Relation of temperature and other factors to blackening of boiled potatoes*, O. Smith, L. B. Nash, and A. L. Dittman.—Nutrition, soil moisture, soil reaction, and light were found in the earlier studies to exert little effect on occurrence of stem-end blackening, except as to effect on time of maturity. Little or no blackening was found in samples which in 1940 matured under mean temperatures of 70° F. or higher, while samples maturing under 60° or less usually blackened. The regions in which the blackening problem was severest had the lowest mean temperatures while the tubers were maturing. Where the problem is serious, varieties maturing earlier than Pioneer Rural, Green Mountain, and Sebago, wherever feasible, are suggested, with earlier planting dates where time of maturity can be influenced thereby. Any means of maturing the potatoes before low temperatures prevail in the fall will tend to reduce the amount of blackening.

Exposure of tubers known to blacken severely to 100° for from 3 to 4 days prevented practically all blackening when boiled. Storage at 90° for several days also reduced the amount of blackening. A high correlation existed between the pH of tuber tissue and degree of blackening. The pH of tubers which blacken is higher at the stem end, and blackening occurs there first and to a greater degree than at the apical end. The pH of tubers could be increased and blackening decreased by storage at high temperatures, storage in certain gases, or boiling in certain acidified solutions.

Potato quality.—V, Relation of time of planting, time of harvest, and fertilizer treatment to composition and cooking quality, O. Smith and L. B. Nash. (Cornell Univ.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 5, pp. 437–451, figs. 4*).—Smooth Rural potatoes subjected to 10 fertilizer treatments were planted May 15 and June 1 and 15, and tubers from each treatment were harvested August 16, September 7, and October 5. Tubers at the first harvest from the first planting consistently were higher in specific gravity and dry weight than those from the second and third plantings. Date of planting had no consistent effects on occurrence of blackening. The riper tubers were mealier in texture than those planted later and less mature. When boiled, the tubers harvested later blackened more and had a higher texture rating than those harvested early. Average weight per tuber and number of tubers in each specific gravity group rose steadily from the low range to a maximum at the medium and then declined at the high specific gravity range. A relationship existed between temperature and light conditions during the latter part of the growing season and the specific gravity, dry weight, color, and texture of boiled tubers grown thereunder.

Weak neck in sorghum, R. W. LEUKEL, L. E. MELCHERS, and A. F. SWANSON. (U. S. D. A. coop. Kans. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 2, pp. 163–165*).—Weak neck (E. S. R., 80, p. 478), further studies showed, is a condition of over-ripeness accompanied by weakness of tissues in the rachises and peduncles, especially of the primary culms, in certain sorghums, as milos and feteritas and many of their derivatives, and is not caused by a pathogen. This condition, however, may be aggravated by subsequent invasion of organisms that produce decay of the peduncle. Environmental factors, as temperature, moisture, soil type, and fertility, were not wholly responsible. The remedy for weak neck seemed to lie in developing combine types of sorghum that ripen more like sorgo and kafir and less like milo, e. g., as Westlane and Kalo selection H C 617, or development of combine varieties having more strengthening tissue that will support the head after the peduncle is dry.

Muck soil management for sugar beet production, P. M. HARMER (*Michigan Sta. Cir. 187 (1943), pp. 20, illus. 8*).—Production of high yields of sugar beets of excellent shape, high sugar content, and high purity on muck soil has been found to depend on type of muck to be cropped, its drainage conditions, fertilization, length of growing season, crop stand, beet variety, cultural methods, amount of leaf spot, and amount of frost injury during early and late growth. Discussion of these factors and practical recommendations are based extensively on station research largely reported earlier (E. S. R., 68, p. 734; 77, p. 308; 85, p. 592; 86, p. 741; 87, p. 189).

A statistical analysis of varietal yields of sugarcane obtained over a period of years, G. ARCENEAUX and L. P. HEBERT. (U. S. D. A.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 2, pp. 148–160*).—Cane yield data from variety tests at four stations in Louisiana, 1937–40, revealed significant increases in variance due to interaction of variety × station, variety × year, and variety × station × year. Over the period, certain varieties tended to give relatively increased yields from year to year, while others displayed a significantly opposite trend. Important changes in the environment with respect to diseases might occur from year to year, and these may condition greatly the performance of a given plant. The importance of possible changes in varietal yield capacity over a period is emphasized, and a method to measure such changes is illustrated.

U. S. sugar beet seed meets war crisis, G. H. COONS. (U. S. D. A.). (*Sugar [New York], 38 (1943), Nos. 1, pp. 18–23, illus. 5; 2, pp. 22–28, illus. 6*).—An account of the growth of a domestic sugar beet seed industry through the development of curly top- and leaf spot-resistant varieties by the U. S. Department of Agriculture (B. P. I.), research on seed production by the New Mexico, California, and other experiment stations cooperating with the Department, and multiplication of adequate supplies of commercial seed by beet sugar companies.

Use of electricity in curing and storing sweetpotatoes, J. B. EDMOND and G. H. DUNKELBERG. (Clemson Agr. Col.). (*Amer. Soc. Hort. Sci. Proc., 40 (1942), pp. 528–530*).—Further studies (E. S. R., 86, p. 39), 1938–39 to 1940–41, inclusive, determined that from 0.37 to 1.10 kw.-hr. of electricity were necessary to cure each bushel of sweetpotato roots and from 1.16 to 2.72 kw.-hr. to store each bushel. Curing evidently was more economical of electricity when the root were harvested during warm weather than during cool weather. A high relative humidity could be maintained during curing and storage by proper application of water to a dirt floor. An economical source of heat for curing and storing, electricity had an additional advantage of maintaining a relatively uniform temperature, together with a uniform relative humidity, factors favorable for long storage life of the roots.

Some of the factors affecting the carotene content of sweet potatoes, J. C. Miller and H. M. Covington. (La. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 40 (1942), pp. 519–522*).—Porto Rico sweetpotatoes of 51 μg. carotene content at harvest gained rapidly in carotene content during the first month of storage (75.3) and gradually during the second month of storage (81.9 μg.), after which time carotene content tended to remain constant. "Although the carotene content of sweetpotatoes may be materially changed by environmental factors and cultural practices, the most feasible means of increasing the carotene content is by hybridization." Carotene contents are also shown for a number of seedlings and their parents.

Certified tobacco seed, J. Johnson and H. E. Heggestad (*Wisconsin Sta. Bul. 458 (1943), pp. 24, illus. 5*).—The organization, objectives, and methods of the certified tobacco seed program carried on by the Wisconsin Agricultural Experimental Association are described, with information and regulations for seed growers and remarks on how certified seed helps the grower, buyer, manufacturer, pool, and seed grower; permits better service by the experiment station; and reduces chances of spread of wildfire. Certified varieties (E. S. R., 83, p. 334) are Comstock Spanish, Havana No. 38, and Wisconsin Spanish for new land, i. e., 1–3 yr. in tobacco; Havana No. 142 and No. 211 on fertile tobacco land, i. e., in tobacco 3 yr. or longer; and Wisconsin Seedleaf for relatively infertile land.

Some chemical and pharmacological observations on "low nicotine" tobacco, H. B. Haag and P. S. Larson (*Science, 97 (1943), No. 2512, pp. 187–188*).—Toxicological studies on mice and blood pressure determinations in the dog showed that the toxic and vasopressor effects of the smoke from low-nicotine burley tobacco, supplied by the Kentucky Experiment Station, was proportional to the amount of nicotine present and relatively independent of the nornicotine content of the tobacco. On man the smoke produced very much less pronounced effects on blood pressure and pulse rate than that produced by ordinary cigarettes.

Response of wheat varieties to different levels of soil productivity.—I, Grain yield and total weight, W. W. Worzella. (Ind. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 2, pp. 114–124, illus. 2*).—Grain yield and total weights are reported for Purdue No. 1, Trumbull, American Banner, Michigan Amber, and Michikof varieties of wheat grown on three levels of soil fertility on each of Plainfield fine sand and Crosby and Alford silt loams, 1937–41. On each soil type differences due to variety and fertility were significant or highly significant. Varieties responded differently to various levels of soil fertility established by addition of mineral fertilizers, tending to fall into distinct response groups. Certain varieties yielded relatively higher on the heavier fertilized plats, while others were relatively more efficient on low-fertility plats. The highest yielding variety, however, ranked first in yield on all fertility levels, while the low-yielders usually produced the least grain on all levels. Variety × fertility level interactions for grain yield were significant but not great enough to change yield ranks. Therefore, the same adapted variety would be recommended for all productivity levels of a soil.

Registration of improved wheat varieties, XV, J. A. Clark. (U. S. D. A. et al.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 3, pp. 245–248*).—Varieties approved for registration (E. S. R., 86, p. 186) in 1942 were two productive hard red winter wheats—Pawnee, developed from Kawvale × Tenmarq, highly resistant to loose smut, moderately resistant to bunt and leaf rust, slightly resistant to or escaping stem rust damage, and resistant to hessian fly; and Comanche, derived from Oro × Tenmarq, containing good milling and baking quality and other good characters, with high resistance to many races of bunt, resistance to leaf rust, and tolerance to stem rust.

Baking tests and the evaluation of new wheats, E. G. BAYFIELD and G. A. WEST. (Kans. Expt. Sta.). (*Cereal Chem., 19 (1942), No. 4, pp. 493–507, illus. 2*).—Study of several hard and soft winter wheat varieties grown in Kansas in 1940 showed that choice of baking formula is important in deciding which variety is most likely to suit market requirements. In discussion of the possible use of the regression coefficient of loaf volume upon protein content as a protein-quality factor, type of regression line is shown to depend upon baking formula and variety. It is preferable to test new varieties by a method found adapted to a variety widely acceptable industrially. New varieties not responding similarly to the standard variety may prove unacceptable to milling and baking industries even if potentially desirable otherwise.

Commercial agricultural seeds, 1942, G. P. STEINBAUER (*Maine Sta. Off. Insp. 186 (1942), pp. 82–107*).—The percentages of purity, inert matter, germination, weed seeds, and hard seeds (in legume seed), and number of noxious weed seeds per pound are tabulated for 182 samples of agricultural seed collected from dealers in Maine in 1942.

Battling weeds on Minnesota farms, H. K. WILSON, L. M. STAHLER, A. C. ARNY, R. B. HARVEY, A. H. LARSON, and R. H. LANDON (*Minnesota Sta. Bul. 363 (1942), pp. 28, illus. 10*).—Practical methods of controlling weeds (E. S. R., 34, p. 339; 68, p. 473) by cultivation, smother crops, grazing, and chemicals are reported from experiments on field bindweed, quackgrass, leafy spurge, perennial sowthistle, Austrian fieldcress, annual weeds, and lawn weeds.

Field bindweed could be eradicated in from 2 to 3 yr. by a season of cultivation with a duckfoot cultivator, followed by rye or winter wheat sown about September 15. The grain is removed as early as possible and cultivation resumed. Biweekly cultivation was more effective than more frequent tillage. Cultivation of bindweed-infested fields until July 1, followed by a summer competitive crop, proved valuable, with Sudan grass, millet, sorghum, and soybeans being the best crops tested. Bindweed was eradicated in from two to three seasons on areas seeded to rye or winter wheat and grazed by sheep until June 15, followed by summer fallow and grain sown again September 15.

Sodium chlorate, the best chemical for eradicating long-lived perennials, was most effective when applied in the late summer or early fall and at the rate of about 500 lb. per acre. Sinox (E. S. R., 83, p. 55) has killed mustards, wild radish, wild buckwheat, and ragweeds, with little damage to flax. Crabgrass, dandelions, and mouse-ear chickweed were destroyed by spray applications of 0.5 gal. of water-white kerosene (color Saybolt 23) to each 100 sq. ft.

Soil conditions affecting herbicidal action of chlorates: A literature review, A. M. HURD-KARRER (*U. S. Dept. Agr., Bur. Plant Indus., [1942], pp. 13*).—The review covers 35 references.

HORTICULTURE

Experiments with vegetables at the Conservancy District Substation, R. STROUD (*New Mexico Sta. Bul. 302 (1943), pp. 19, illus. 2*).—From 1938 to 1942, varietal and cultural trials were conducted with vegetables at the substation located about 6 miles south of Albuquerque. Good success was obtained with onions grown from plants set in the field in early spring, from seed sown in the spring, and from seed sown in September for the production of bulbs which were harvested the following summer. Irish Cobbler potatoes, planted about April 10, produced satisfactorily when psyllids were controlled with sulfur dust. Of 19 varieties of tomatoes, Pearson, Nystate, John Baer, Bonny Best, Stokesdale, and Greater Baltimore proved most valuable in about the order named. Head lettuce planted from August 1 to 20 gave good results, and Imperial 44 was the best variety. Preliminary work with cucumbers, carrots, peppers, and sweetpotatoes also yielded some valuable information as to adaptable varieties.

Starting vegetable plants in Colorado, A. M. Binkley (*Colorado Sta. Bul. 475 (1943), pp. 24, illus. 9*).—A revision of Bulletin 328 (E. S. R., 59, p 41).

Vegetable varieties for home and commercial gardens in eastern, central, and western Washington, C. L. Vincent, W. J. Clore, C. D. Schwartze, and T. E. Randall. (Coop. West. Wash. Expt. Sta.). (*Washington Sta. Pop. Bul. 167 (1943), pp. 16, illus. 1*).—In tabular form, information is presented on desirable varieties, time of planting, and time required to attain edible maturity, with notes on disease resistance, utilization, etc.

La cachaza como fertilizante para las hortalizas: Pruebas con tomates y pepinillos [Filter press cake as fertilizer for horticultural crops: Trials with tomatoes and cucumbers], A. Riollano (*Agr. Expt. [Puerto Rico Univ. Sta.], 2 (1942), No. 6, p. 7*).—With the tomato the use of filter cake caused increases of about 20 percent in the production of marketable tomatoes, and good results were obtained also with cucumbers.

Fungicides and insecticides, 1942, E. R. Tobey (*Maine Sta. Off. Insp. 186 (1942), pp. 108–120*).—Herein are presented, largely in tabular form, the results of analyses of 123 samples collected in 1942.

Analyses of materials sold as insecticides and fungicides during 1942, C. S. Cathcart and R. L. Willis (*New Jersey Stas. Insp. Ser. 8 (1942), pp. 18*).

El cultivo de la habichuela [Culture of the kidney bean], G. A. Lebedeff and J. Adsuar (*Agr. Expt. [Puerto Rico Univ. Sta.], 3 (1943), No 1, pp. 10–11*).—General information is given on selection and preparation of soils, fertilizers, cultivation, etc.

Changes in specific gravity of new and old types of lima beans with increase in maturity, C. W. Culpepper and R. Magruder. (U. S. D. A.). (*Canner, 96 (1943), No. 7, pp. 28, 30, 32*).—Determinations of specific gravity of the seeds of four types of lima beans were made at several stages of development and at dry ripeness. At all stages of maturity except the very young and the very old, the Wrinkled Seeded and Fordhook varieties were markedly lower in specific gravity than were Henderson Bush, Green Seeded Henderson Bush, and Baby Fordhook. The green or immature seeds of the first two varieties were also higher in moisture content and the full-sized green seeds shrunk more on drying. The dry seeds of the first two varieties absorbed more water, swelled more on soaking, and after soaking cooked to a softer consistency sooner than the other kinds included in the test.

Close spacing, medium fertilizer rate, most profitable for pickling cucumbers, W. S. Anderson (*Miss. Farm Res. [Mississippi Sta.], 6 (1943), No. 3, p. 8*).—Four rates of application, 500, 1,000, 1,500, and 2,000 lb. per acre, of a 6:8:6 fertilizer were tested for cucumbers grown on two fields. In both cases the greatest net profit was obtained from the 1,000-lb. applications, although yields were actually somewhat larger with the higher applications. With hills spaced 7.5, 15, 30, and 45 in. apart in 6-ft. rows, somewhat larger yields were obtained with a close spacing, but when considered at any one fertilizer level the yields were very nearly equal.

Nueva variedad de melones para Puerto Rico [New varieties of melons for Puerto Rico], A. Riollano (*Agr. Expt. [Puerto Rico Univ. Sta.], 2 (1942), No. 6, pp. 7–8*).—Among a large number of varieties tested for adaptation to Puerto Rico, Rocky Dew Orange and Smith Perfect were most promising. Of the two, Smith Perfect was the more productive and showed marked resistance to mildew.

The Truhart Perfection pimiento, H. L. Cochran (*Georgia Sta. Bul. 224 (1943), pp. 18, illus. 8*).—A descriptive account is presented of the origin and development of an improved type of pimiento pepper, designated as the Truhart Perfection. The merits of the new variety rest in its productiveness, color, thickness of flesh, uniformity in size and shape, and the fact that the plant provides ample protection to the fruit from sun scald injury.

Tomato varietal yield tests, P. D. Hargrave (*Sci. Agr., 23 (1943), No. 6, pp. 322–326*).—Under the northern conditions of Brooks, Alta., the indeterminate growth types of tomato were generally too late in fruit maturity to be really worth while. On the other hand, the determinate types proved promising as shown in the fact that in each of 4 yr. the North Dakota varieties Bison and Allred were among the six most productive kinds. Hybrids developed at Brooks from crosses of Farthest North and early large-fruited varieties gave good results and bore larger and more desirable fruits than the Farthest North parent.

Influence of soil fertility upon the quality of tomatoes, J. B. Hester (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 243–245*).—The influence of drainage, organic matter, pH, available potash, available magnesium, available manganese, and soil fertility on tomato quality is reported.

Practical propagating results with nursery seed stocks, P. D. Hargrave (*Sci. Agr., 23 (1943), No. 6, pp. 327–331*).—Information is given on seed stratification, sowing, and handling for various fruits and ornamentals. In general, sand was a better medium than peat moss, which in some cases injured the germinating seed, probably because of its low pH value.

Protect the fruit crop this year to meet war needs, C. Lyle (*Miss. Farm Res. [Mississippi Sta.], 6 (1943), No. 3, pp. 1, 7*).—Information is presented on the spraying requirements of the peach, plum, pear, and apple.

Nitrogen, phosphorus, and potassium interrelationships in young peach and apple trees, F. P. Cullinan and L. P. Batjer. (U. S. D. A.). (*Soil Sci., 55 (1943), No. 1, pp. 49–60, illus. 1*).—Studies of the growth responses of young peach and apple trees to varying nutrient levels of N, P, and K in sand cultures showed that growth is strikingly affected by lack of adequate N. With insufficient N the effects of low P or low K on growth was not so marked, but under a high-N level growth-deficiency symptoms appear when either P or K is present in low concentration. The deficiency symptoms were more marked in the peach than in the apple, but K-deficiency symptoms in the peach were also more noticeable under a high Ca: K ratio. Leaf analyses showed that the content of N, P, and K in the leaves is related to the supply in the nutrient solution even when fairly wide ratios of concentrations are maintained. P deficiency was not found to any appreciable extent under field conditions, with both the peach and apple apparently obtaining sufficient amounts from the soil to maintain satisfactory growth.

Effect of commercial fertilizers on performance of peach trees, J. R. Cooper (*Arkansas Sta. Bul. 429 (1943), pp. 46, illus. 3*).—Continuing this series (E. S. R., 61, p. 835), all three of the major elements, N, P, and K, were found necessary for satisfactory growth and production of peaches growing on Ruston fine sandy loam. Nitrate of soda was the most satisfactory source of N, but with the addition of lime to correct acidity sulfate of ammonia appeared to be equally effective. Cyanamid was a less satisfactory source of N than was nitrate of soda, and kainite was not as good a source of K as was muriate or sulfate of potash. Color of fruits was affected by fertilizer only as such treatments influenced shading by increasing or decreasing growth. Fertilizer treatments had no measurable effects on quality or texture of the fruits. Maturity of fruit was delayed by all three elements N, P, and K. N from all sources moved readily downward in Ruston fine sandy loam but much more slowly in Newtonia silt loam. The downward movement was more rapid in nitrate of soda than in ammonium sulfate, but additions of agricultural limestone tended to increase the movement of the sulfate of ammonia. P, on the other hand, was practically fixed at the point of distribution on both soils. K moved downward on both soils at a relativetly slow rate. The use of a ton of limestone per acre resulted in increased growth and production. Optimum terminal growth was from 18 to 24 in. for 4-yr. trees and from 10 to 12 in. for 10- to 12-year-old trees. There was a reduction in the number of fruit buds, per unit of length, as the shoots became longer. Winter-killing of buds occurred on all treatments but was more severe on trees which made least growth the preceding season and on those that dropped their leaves early in the autumn. Fertilizer treatments had no effect on resistance to frost injury, except as they affected the date of bloom.

Some effects of excess boron on the storage quality of apples, J. C. Wilcox and C. G. Woodbridge (*Sci. Agr., 23 (1943), No. 6, pp. 332–341, illus. 3*).—Mature McIntosh and Jonathan apple trees growing at Kelowna, B. C., in a shallow sandy loam soil that contained no free carbohydrates were treated variously with borax and boric acid applied to the soil. In one series applications of from 4 oz. to 4 lb. per tree were made in 1936, and in another series from 1 oz. to 4 lb. per tree were applied annually from 1936 to 1941. Observations on stored fruits showed that the heavier applications of boron induced a characteristic browning of the flesh of the McIntosh. This discoloration was confined almost entirely to the core ring and to the flesh around the stem cavity. However, only the heaviest applications caused sufficient injury to render the fruit unmarketable. In the Jonathan apple water core and flesh break-down were increased by excessive applications of boron. The extent of boron injury varied with the season, the size of crop, and the stage of maturity when harvested. High positive correlations were observed between boron in the soil and boron in the fruit, and between each of these values and the amount of injury.

Some observations on the use of ventilated containers for packing peaches, E. W. Greve. (Univ. Del.). (*Peninsula Hort. Soc. [Del.] Trans., 56 (1942), pp. 47–51*).—Comparisons in the summer of 1942 of the tub bushel basket with a ventilated box crate for handling peaches were more favorable to the boxes. Temperature readings taken after 18 and 50 hr. in the middle of the fruit in both containers were in every instance lower in the ventilated crates. The percentage of decayed peaches was less in the ventilated box than in the tub basket.

The causal sequence of fruit development, M. B. Crane and A. G. Brown (*Jour. Genet., 44 (1942), No. 2–3, pp. 160–168, illus. 3*).—It was observed during pollination and breeding studies with plums that some pollinations gave rise to earlier maturing fruits and in certain cases resulted in significant effects on the size of the fruit. For example, Myrobalan Red selfed fruits were still green when Myrobalan × Blue Rock fruits were red and almost ripe. None of the Myrobalan × Blue Rock fruits formed seeds, while all of the selfed fruits contained good seeds. Myrobalan × *Prunus spinosa* ripened intermediately, with 94 percent of the fruits containing good seeds. Apparently in the case of Myrobalan × Blue Rock fertilization occurred, with a subsequent break-down in embryo development.

Small fruit varieties for home and commercial gardens in eastern, central, and western Washington, C. L. Vincent, W. J. Clore, and C. D. Schwartze. (Coop. West. Wash. Expt. Sta.). (*Washington Sta. Pop. Bul. 168 (1943), pp. 16, illus. 1*).—Information is offered, largely in tabular form, on desirable varieties, their season of maturity, character and usefulness of the fruit, etc.

Strawberry growing in Michigan (*Michigan Sta. Spec. Bul. 182, rev. (1943), pp. 40, illus. 8*).—This, the third revision of a bulletin originally issued in 1928 (E. S. R., 60, p. 341), is presented in three parts: (1) Strawberry Culture, by R. E. Loree; (2) Strawberry Insects, by R. Hutson; and (3) Strawberry Diseases, by D. Cation. The information is brought up to date with new cultural information, and descriptions of new varieties and of new diseases, such as red stele, etc

The Burgundy strawberry, A. N. Wilcox, W. H. Alderman, F. E. Haralson, J. D. Winter, W. G. Brierley, and T. S. Weir. (Minn. Expt. Sta.). (*Minn. Hort., 71 (1943), No. 3, pp. 35–36, illus. 1*).—The origin, development, and outstanding characteristics of a new Minnesota Station variety are discussed.

Progress report on avocado breeding, W. E. Lammerts. (Univ. Calif.). (*Calif. Avocado Soc. Yearbook, 1942, pp. 36–41, illus. 1*).—Controlled pollination by bees in screened or greenhouse chambers proved to be a practicable method of breeding avocados. The Fuerte variety was found to be an exceedingly poor female parent but a satisfactory pollen parent. There was a well pronounced tendency for seedlings to resemble the parent variety. Hybrids from known parents may be obtained if sufficiently large numbers of flowers are emasculated and pollinated. Pollinations made during the end of the flowering period of any given variety appeared to be most successful. Cross or close pollination under field conditions is effected normally by dipterous and hymenopterous insects, inasmuch as no fruit was set on unpollinated flowers of the A group of varieties protected by screened cages.

Effect of the removal of the seed coats on avocado seed germination, E. R. Eggers, (Univ. Calif.). (*Calif. Avocado Soc. Yearbook, 1942, pp. 41–43, illus. 1*).—The removal of seed coats from avocado seeds prior to planting tended to hasten germination from 4 to 6 weeks and also to promote uniformity in the stand and in the size of the seedlings.

Leaf sap concentration and cold resistance in the avocado, F. F. Halma. (Univ. Calif.). (*Calif. Avocado Soc. Yearbook, 1942, pp. 48–53, illus. 4*).—Leaf sap concentration studies with eight avocado varieties covering a period of 2 yr. revealed no relationship between the osmotic value of the expressed sap and cold hardiness. The percentage of total soluble solids was in most cases consistently higher for the hardy than for the relatively tender varieties.

Handling avocado orchard soils, M. B. Rounds. (Calif. Citrus Expt. Sta.). (*Calif. Avocado Soc. Yearbook, 1942, pp. 69–70*).—Information is given on the selection and handling of soils.

The nitrogen requirement of the avocado tree in California, R. W. Hodgson. (Univ. Calif.). (*Calif. Avocado Soc. Yearbook, 1942, pp. 33–35*).—Some evidence is presented in support of the thesis that the avocado tree has a lower nitrogen requirement than certain other trees, including citrus. Some of the most profitable avocado orchards have been in Bermuda sod for as long as 10 yr. without showing loss of vigor or productiveness. In an experiment 200 lb. of cereal straw was spaded into the soil under the spread of a Fuerte tree. Although 6 mo. later there was only a trace of nitrate left in the soil, the trees did not show any harmful effects.

Anatomy of the avocado fruit, K. Cummings and C. A. Schroeder. (Univ. Calif.). (*Calif. Avocado Soc. Yearbook, 1942, pp. 56–64, illus. 14*).—There are presented the results of studies of the normal fruit of several varieties of avocado.

Woody avocado fruits, C. A. Schroeder. (Univ. Calif.). (*Calif. Avocado Soc. Yearbook, 1942, pp. 54–55, illus. 1*).—Anatomical studies of abnormal avocado fruits which resemble irregular-shaped masses of woody tissue showed these to be unlike the normal fruits and to have instead the structure of a woody stem with the greater portion consisting of vessels, fibers, and woody parenchyma cells.

The effect of pH and of certain minor elements on the growth of pineapples in water cultures, N. A. Schappelle (*Jour. Agr. Univ. Puerto Rico [Univ. Sta.], 26 (1942), No. 3, pp. 61–72, illus. 3; Span. abs., p. 72*).—For pineapples a pH value of 4.0–4.5 was found favorable for growth in water cultures. At pH values above 5 chlorosis became increasingly severe. The higher pH values promoted excellent root development, while below pH 4.0 they caused a short, stubby root system. Manganese and zinc tended to cause chlorosis, which is due to the non-functioning of iron in the plant. Aluminum and boron tended to counteract the effect of manganese and zinc and to promote a normal condition of the pineapple plants. Copper added at the rate of 2 p. p. m. controlled a root fungus that caused stunting of the pineapple plants. No correlation was established between pH value or minor element composition and gummosis.

Fertilizer studies with pineapples in Puerto Rico, N. A. Schappelle (*Jour. Agr. Univ. Puerto Rico [Univ. Sta.], 26 (1942), No. 3, pp. 41–60+, illus. 5; Span. abs., pp. 58–59*).—In experiments on two types of soil there was noted no significant beneficial effect from applications of phosphates, but nitrogen and potash gave significant increases over the nonfertilized plats in 11 out of 14 cases. If potash was omitted from the fertilizer the quality of the pineapple fruit was lowered as judged by acidity, sugar concentration, and flavor. The keeping quality of pineapple was not affected by any of the fertilizer treatments used. Applications of lime to raise the pH value of the soil to approximately 5.0 appeared to increase yields on both soil types. Applications of small amounts of magnesium tended to increase yields. Ammonia nitrogen was more beneficial than nitrate nitrogen in preventing the chlorotic condition in the pineapple.

The process of oil formation and accumulation in the macadamia, W. W. Jones and L. Shaw. (Hawaii Expt. Sta.). (*Plant Physiol., 18 (1943), No. 1, pp. 1–7*).—Beginning at approximately 90 days after flowering, embryo enlargement and accumulation of oil were very rapid—in fact 70 percent of the oil was formed in 44 percent of the total growth period of the fruit. The materials utilized in oil formation moved into the fruit from outside sources. Oil and protein synthesis proceeded concurrently. Hexose sugar was apparently the starting point for oil formation.

Orchard management and cost of pecan production, R. S. Washburn and H. L. Crane (*U. S. Dept. Agr., Bur. Agr. Econ. and Bur. Plant Indus., 1942. F. M. 37, pp. 77+, illus. 2*).—This constitutes a revision in mimeographed form of those phases dealing with orchard management and production costs presented in Technical Bulletin 324 (E. S. R., 68, p. 394).

Effects of daylength and temperature on growth and flowering of some florist crops, K. Post (*[New York] Cornell Sta. Bul. 787 (1942), pp. 70, illus. 25*).—The physiology of the function of day length and temperature in regulating the development and flowering of plants is discussed, and the response of a large number of species of ornamentals to various light and temperature conditions is described. The importance of temperature control for bud formation is said to be equal to that of day length for most plants, and certain species do not respond to modifications in day length unless the temperature is within the proper range. Some species require a temperature below 65° F. for bud formation, while others need a temperature above 60°. Practical recommendations are presented.

"Good neighbor" flowers, C. O. Erlanson and B. Y. Morrison (*U. S. Dept. Agr., Off. Foreign Agr. Relat., Agr. in Americas, 3 (1943), No. 4, pp. 63–65, illus. 3*).—Brief comments are given on a number of garden flowers originated in and introduced from South and Central American countries.

What made Crimson Glory, T. J. Maney and C. D. Paris. (Iowa Expt. Sta.). (*Amer. Rose Ann., 1943, pp. 88–90*).—The authors map and discuss the ancestry of the Crimson Glory rose.

Getting rid of blues and thorns, N. E. Hansen. (S. Dak. State Col.). (*Amer. Rose Ann., 1943, pp. 139–140, illus. 1*).—A progress report is given on the breeding of thornless roses, including the new variety Zitkala.

How frost damage occurs, R. C. Allen and G. N. Asai (Cornell Univ.). (*Amer. Rose Ann., 1943, pp. 95–99, illus. 1*).—No correlation was observed between moisture content of rose canes and the amount of winter injury. The resistance of canes to low-temperature injury varied with the season, the resistance increasing up to about December 15. Varieties differed markedly in their resistance to low temperature. In general, the hardier varieties had smaller cells in the phloem and outer cortex, and upon thawing water returned to the cells of the hardier varieties with little or no ill effects. There was some evidence that root tissues in a given variety are less hardy than the top tissues.

Studies in the nature of the clonal variety.—II, Selection within a periclinal chimera, V. R. Gardner and W. D. Baten (*Michigan Sta. Tech. Bul. 179 (1942), pp. 48, illus. 30*).—In this second contribution (E. S. R., 80, p. 324). selections of the white-margined Madame Salleron *Pelargonium*, in cultivation for more than 50 yr. and long recognized as a highly variable form with respect to color pattern of the leaves, were studied in detail throughout three vegetative generations with respect to leaf size, leaf texture and dentation, plant size, and branching habits. The study led to the following findings:

(1) Intravarietal variations as single leaves, branches, or of the whole plant were found to be of very frequent occurrence; (2) many variations were great enough in degree or amount to be classified as distinct types when the data were analyzed statistically; (3) some variations were of a magnitude equivalent to differences between well recognized varieties in other plant species; (4) many of the observed differences remained constant throughout the life of the plant and were reproduced faithfully in the first, second, and third generations; (5) most of the observed variations appeared suddenly as bud sports, but some developed gradually, becoming more marked with each succeeding generation; (6) the Madame Salleron *Pelargonium* is described as a periclinal chimera with respect to the white-edged character of its leaves. As to the other characters studied, it may or may not be a chimera, but conceivably the variety may be heterochimeric; and (7) the generally held views as to the constancy of clonal varieties must be altered for chimeras and likewise for some of the other kinds of clons, or else many of the clons not now considered to be chimeras must be so classified.

Quebracho makes shoes, S. B. Detwiler (*U. S. Dept. Agr., Off. Foreign Agr. Relat., Agr. in Americas, 3 (1943), No. 4, pp. 65–67, illus. 1*).—Two species, *Schinopsis balansae* and *S. lorentzi*, are discussed as important sources of commercial tannin.

FORESTRY

Forest resources of the ponderosa pine region of Washington and Oregon, R. W. Cowlin, P. A. Briegler, and F. L. Moravets (*U. S. Dept. Agr., Misc. Pub. 490 (1942), pp. 99+, illus. 48*).—Herein are presented the results of a survey conducted by the Pacific Northwest Forest and Range Experiment Station upon the forest resources of the ponderosa pine region of Washington and Oregon. Among findings are that this region produces one-half the total ponderosa pine cut in the entire United States. The important problem is to bring about a shift from the present practice to a light, maturity-selection cutting. The region has 22.1 million acres of forest land covering roughly one-third of the total land area. The region's total saw-timber stand is 127.1 billion board feet, of which 81.5 billion board feet is ponderosa pine. Approximately half the forest land and saw timber is in national forests, one-third is privately owned, and the remainder is in public or Indian ownership.

Factors influencing the natural restocking of high altitude burns by coniferous trees in the central Rocky Mountains, R. Stahelin. (U. S. D. A. coop. Colo. State Col.). (*Ecology, 24 (1943), No. 1, pp. 19–30, illus. 3*) — Studies of the regeneration in the Englemann spruce-alpine fir type in eight areas in Colorado and Wyoming, all of which were burned over during the period 1860–92, indicated that the destruction of the climax forest by fire gave rise to the establishment of a fire subclimax of aspen and lodgepole pine as well as an invasion by plants of the Carex-Poa association at the higher and by grassland associations at the lower elevations in the subalpine forest zone. The subclimax prevailing in the secondary succession has a strong influence on the rate of recovery of the coniferous cover. Where lodgepole pine was represented in the original stand, a sufficient number of lodgepole pine seeds escaped destruction to supply eventually a stand of trees to reestablish the species within 50 to 100 yr. Outside of the distribution of lodgepole pine, aspen constitutes the typical fire subclimax at lower elevations in the subalpine forest zone. Aspen creates a favorable environment for the establishment of spruce and fir seedlings, and the rate of coniferous restocking under aspen depends on the presence of seed trees which escaped destruction in the fire. Sedges, grasses, and other species characteristic of the subalpine grassland build up a dense turf on burned-over areas located above the distribution of lodgepole pine and aspen, with indications that this grass cover may maintain itself for centuries. Grassy areas with less than 10 seed trees per acre must usually be replanted in order to reestablish a coniferous stand.

The successional rôle of southern white cedar, Chamaecyparis thyoides, in southeastern North Carolina, M. F. Buell and R. L. Cain. (N. C. State Col.). (*Ecology, 24 (1943), No. 1, pp. 85–93, illus. 4*).—Southern white cedar in southeastern North Carolina is a pioneer forest community on open peat soils. In the case of peat soils covered with a luxuriant woody vegetation, fire is necessary for clearing the land for cedar. To be effective, fire must occur only at a time of high water table which prevents the destruction of the raw surface peat containing the seeds. Protected from fire, the cedar will give way in the natural course of succession to the bog climax, a broadleaf forest of swamp bay with which are associated several other small evergreen or semievergreen hardwood species.

Trees of Puerto Rico, II, L. R. Holdridge (*U. S. Dept. Agr., Forest Serv., Trop. Forest Expt. Sta. Occas. Paper 2 (1942), pp. 105+, illus. 50*).—This, the second in a series, contains descriptive and other information on 50 additional species (E. S. R., 87, p. 803).

Cooperative management and marketing for the woodland owner (*U. S. Dept. Agr., Farmers' Bul. 1927 (1943), pp. 16+, illus. 9*).—The fundamentals of good cooperatives and the possibilities in woodland ownership associations are outlined, and the work and operation of several representative forest products associations located in various parts of the United States are discussed. A prime requisite for the success of woodland cooperatives is said to be the practice of sound forest management by the members.

Marketing timber in the north central area of Indiana, R. C. Brundage (*Indiana Sta. Bul. 477 (1942), pp. 28, illus. 14*).—Studies in five northern counties—La Porte, St. Joseph, Elkhart, Marshall, and Kosciusko—where the annual consumption of timber exceeds 14 million board feet, log measure—showed during the period of investigation the greatest demand for sugar maple, white oak, red oak, basswood, white ash, and tulip poplar. Sugar maple was the most important, contributing nearly 23 percent of the total cut for mills in the area. In observed sales 73 percent of the marketed timber was sold at the farm either as stumpage or as logs, with marketing on the stump the most common method. Stumpage prices varied apparently more in relation to the owner's knowledge of timber volume and value than in relation to quality or distance to markets. Owners experienced in logging timber to meet market specifications earned approximately $4 per thousand board feet in extra income from timber sales. Trees varied in value according to the quality of the products that were obtained from them. When the spread in value between log grades is wide, it is essential to market timber so that the highest number of best grade logs may be produced. The desirability of knowing the grade of logs that will be taken when the timber is evaluated for a definite market or when considering a buyer's offer is evident. In certain sales in which the owners attempted to market produce of high value, the net stumpage returns received were significantly higher than for timber sold log run or for a lump sum.

Stumpage and log prices for the calendar year 1941, H. B. Steer (*U. S. Dept. Agr., Statis. Bul. 78 (1942), pp. 72+, illus. 4*).—In the usual form (E. S. R., 88, p. 58), data are presented on total stumpage and log sales for the Nation and for individual States, together with information on prices, etc.

DISEASES OF PLANTS

Notes on Wisconsin parasitic fungi, II, H. C. Greene (*Wis. Acad. Sci., Arts, and Letters, Trans., 34 (1942), pp. 83–98*).—The collections on which these miscellaneous notes on fungi parasitizing plants are based were made principally in the southern counties during 1940–41.

Notes on some diseases of field crops, vegetables and fruits at the Imperial College of Tropical Agriculture, R. E. D. Baker (*Trop. Agr. [Trinidad], 20 (1943), Nos. 2, pp. 28–32; 3, pp. 59–63*).—These notes refer mainly to the period 1939–42.

Pod spot of okra (Hibiscus esculentus L.) and a leaf spot of Hibiscus rosa-simensis L. in Ceylon, T. E. T. Bond (*Trop. Agr. [Trinidad], 20 (1943), No. 4, pp. 67–70, illus. 4*).—Two *Hibiscus* diseases new to Ceylon are described, viz, a pod spot of okra due to *Ascochyta abelmoschi* and a leaf spot of the Chinese hibiscus (*H. rosa-sinensis*) due to an *Ascochyta* which is believed the same species but which apparently differs somewhat in the dimensions of spores and pycnidia. In comparing the latter diease with what has been found in the literature, a list with notes is presented on eight species of *Phoma*, three of *Phyllosticta*, two or three of *Ascochyta*, and one of *Diplodina* known to occur on species of *Hibiscus*.

A method for maintaining Phytomonas sepedonica in culture for long periods without transfer, A. F. Sherf. (Univ. Nebr.). (*Phytopathology, 33 (1943), No. 4, pp. 330–332*).—Use of mineral oil to maintain the viability of bacteria and fungi without repeated transfers was found practicable. Even though *P. sepedonica* is difficult to maintain with repeated transfers, its viability and pathogenicity were retained up to 18 mo. by covering agar slant cultures with mineral oil.

Pseudomonas aeruginosa; Its role as a plant pathogen, R. P. Elrod and A. C. Braun (*Jour. Bact., 44 (1942), No. 6, pp. 633–644, illus. 4*).—Two isolates of *Phytomonas polycolor* are reported indistinguishable from cultures of *Pseudomonas aeruginosa* on the bases of pyocyanin formation, temperature relations, animal pathogenicity, serological reactions, and biochemical comparisons. Ability to attack tobacco was shown by 15 isolates of *P, aeruginosa* derived from many sources, the type of lesion induced appearing identical with that caused by *Phytomonas polycolor*. Many of these organisms produced a soft rot of vegetables like that ascribed to *Bacterium marginale*. There are 23 references.

Two species of Pythium occurring in southern States, C. Drechsler. (U. S. D. A.). (*Phytopathology, 33 (1943), No. 4, pp. 261–299, illus. 16*).—With warmth and moisture, *P. myriotylum* produces abundant aerial mycelia, and these develop innumerable densely clustered appressoria on encountering solid objects. Much as in *P. butleri*, this aerial growth enables the fungus to destroy bulked vegetables (e. g., cucumbers, summer squash, and string means). This fungus also rather closely resembles *P. butleri* in its asexual reproductive stage, though with minor differences. However, its sexual reproduction differs markedly, seeming, rather, to betray intimate taxonomic kinship with *P. arrhenomanes*. When bathed in fresh water, the oospores often put forth a long simple germ hypha, which, after having received the entire protoplasmic contents, dehisces terminally as a zoosporangium. Another *Pythium*, isolated in Texas from wheat roots, is described as *P. ostracodes* n. sp. It is characterized as a member of the *P. helicoides* series, being distinguished more especially by the very simple make-up of its sexual apparatus. When bathed in fresh water its oospores germinate very readily by producing, often in part through proliferous development, from one to three terminal subspherical zoosporangia.

P. myriotylum, like numerous congeneric forms, is attacked by *P. acanthicum*, *P. periplocum*, and *P. oligandrum*, though less destructively than the familiar pathogenic species *P. ultimum*, *P. debaryanum*, and *P. irregulare*. In their attack the three echinulate fungi send out numerous branches that invest the *P. myriotylum* hyphae, in some places merely causing noticeable abnormality, in some others inducing local disorganization of protoplasmic contents, and in still other places intruding assimilative elements internally. The three echinulate species often envelop filaments of *P. ostracodes* more elaborately but without causing appreciable injury. Furthermore, the hyphae of *P. myriotylum* and *P. ostracodes*, as well as of many other Pythiums, are also subject to elaborate envelopment by such saprolegniaceous root-rotting forms as *Plectospira myriandra* and the three strains of *Aphanomyces cladogamus* occurring, respectively, in diseased roots of pansies, flax, and spinach. Invasion sometimes follows envelopment, but even without it the enveloped *Pythium* filaments suffer local disorganization of contents. The seemingly meager utilization of the degenerating host-fungus materials suggests that the relationship may be more antagonistic than parasitic.

Association of thrips with powdery mildews, C. E. Yarwood. (Univ. Calif.). (*Mycologia, 35 (1943), No. 2, pp. 189–191*) —*Thrips tabaci* was found associated with powdery mildews on grape, rose, strawberry, cataloup, clover, and *Oenothera*. In dish cultures thrips transferred to mildewed leaves of grape and rose thrived better than those transferred to healthy leaves. They appeared to feed on and destroy established mildew colonies on the leaves, but were present in such small numbers in the field as to be of no apparent economic value.

Growth of phytopathogenic bacteria in a synthetic asparagin medium, M. P. STARR, J. E. WEISS, H. P. KLEIN, and C. B. SISSELMAN (*Phytopathology, 33 (1943), No. 4, pp. 314–318*).—Phytopathogenic bacteria (173 isolates of 66 species and varieties) were tested for ability to grow through four successive transfers in a synthetic medium containing asparagin as the only source of C and N. "Certain of the genera and groups comprising the outmoded genus *Phytomonas* Bergey et al." were found to have a distinctive action on this medium; e. g., all of the 60 green-pigmented phytopathogenic *Pseudomonas* isolates grew well on repeated transfer in this medium, whereas none of the 57 yellow *Xanthomonas* isolates did so. Accordingly, this characteristic may prove of value in the taxonomy of bacterial plant pathogens.

Some preliminary studies on the mechanism of virus multiplication, J. SPIZIZEN (*Natl. Acad. Sci. Proc., 29 (1943), No. 3–4, pp. 109–114*).—The processes of virus multiplication and cell growth were separated experimentally in the two anti-*Escherichia coli* bacteriophages and their corresponding host strains studied. Under conditions in which virus multiplication proceeded in the absence of cell growth, it was found that certain specific metabolic poisons inhibited virus growth, whereas others did not. Certain substances known to be involved either as intermediates or as coenzymes in intermediary carbohydrate metabolism in the cell were shown to enhance virus multiplication in the absence of bacterial growth. Finally, arsenite was found to be a specific inhibitor of the multiplication of one of the phages used. Study of this inhibition may give valuable results as to the nature of the reactions involved in virus multiplication.

Virus diseases of vegetables and ornamental plants, A. W. DIMOCK. (Cornell Univ.). (*Florists Exch. and Hort. Trade World, 100 (1943), No. 8, pp. 9, 11*).—The author calls attention to the hazard of virus diseases, with particular reference to their spread from ornamental and other hosts when florists turn to the growing of vegetable seedlings for transplanting in the victory gardening program.

The use of fungicides during wartime, VIII–XII, G. L. MCNEW. (N. Y. State Expt. Sta.). (*Canner, 96 (1943), Nos. 14, pp. 12–14, 16, 26–27, illus. 3; 15, pp. 12–14, 24, 26, 28, illus. 2; 16, pp. 16, 36–40, illus. 3; 17, pp. 12–14, 23–26, 28, illus. 3; 18, pp. 16–17, 26–28, illus. 3*).—Continuing this series (E. S. R., 89, p. 75), five papers are presented:

VIII. *The prevention of tomato leaf blight.*—A six-point program is presented for control of defoliation by various fungi, the most important of which are *Macrosporium solani* and *Septoria lycopersici:* Use of good quality seed, hot water treatment to kill fungi and a chemical protectant to prevent damping-off, spraying of seedlings with "fixed" copper fungicide, transplantation to fields not in tomatoes for at least 2 yr., use of recommended fertilizer practices, and protection of the plants with fungicidal sprays and dusts.

IX. *Effect of different fungicides on leaf blight and yield of tomatoes.*—During the past 3 yr. tests have been made with bordeaux, various fixed copper compounds, and some of the new organic fungicides. Certain of the results are fairly complete and others are still in the preliminary stages; some of the facts obtained are presented to aid growers and canners in judging the value and limitations of a spray program for tomatoes and to evaluate the different spray materials.

X. *Economical use of copper in tomato spraying.*—Data are presented leading to certain conclusions on how to conserve copper spray materials while at the same time obtaining the needed protection and improvement of the tomato crop. In general, the copper fungicides applied as sprays are found more effective than the same amount and kind used as dusts. The fixed copper in copper oxychloride-sulfate proved slightly more effective in increasing yields than that in bordeaux; the dosage may be cut to a very low level, but 3 lb. to 100 gal. is considered a safe minimum.

XI. *The control of Phytophthora fruit rot on tomatoes.*—One of the most serious diseases causing fruit rot in the field is the one due to potato late blight fungus, *P. infestans.* After brief discussion of the symptoms, reason for sporadic epidemics, and the value of crop rotation, the results of 1942 tests with various spray materials are presented in detail. Based on these latest findings, it is recommended that growers be on the lookout for fruit rot in 1943, since it may be present in severe form. It overwinters on potato tubers in the field and develops on volunteer plants, and even disease-free areas may become infested by importation of affected potato "seed" or by wind-borne spores. It can be fully controlled by the regular tomato leaf blight spray program of four applications of copper compounds. A suggested program starts with some insoluble Cu compound about July 20; bordeaux (4–2–50) probably can be substituted after August 1. Four-spray applications at 10- to 12-day intervals are apparently adequate for control.

XII. *Control of anthracnose on cannery tomatoes.*—Anthracnose, or ripe rot, is conceded to be the most important fruit disease of tomatoes and in the past has proved very difficult to control. The results of spray tests with various fungicides on John Baer tomatoes in 1942 indicated convincingly that the disease can be controlled by spraying and that Fermate is not only better than all other materials tried but that it is sufficiently effective to serve in commercial fields, apparently providing more reliable control of anthracnose than any of the old standard fungicides though not so satisfactory against the leaf blight fungi. It is recommended that four applications of Fermate (70 percent ferric-dimethyldithiocarbamate) be made during July and August at the rate of about 2 lb. to 100 gal., but trials should be of limited extent until its adaptability to different conditions is established. Furthermore, a dual program must be worked out for the simultaneous control of both anthracnose and leaf blights.

Fungicidal and phytocidal properties of some metal dialkyl dithiocarbamates, M. C. Goldsworthy, E. L. Green, and M. A. Smith. (U. S. D. A.). (*Jour. Agr. Res.* [*U. S.*], *66* (*1943*), *No. 7, pp. 277–291, illus. 1*).—Studies of the Na, Fe, Zn, Pb, Cu, Ag, and Hg dimethyl, diethyl, and dibutyl dithiocarbamates, in general, indicated the methyl compounds to be most toxic to *Sclerotinia fructicola* and *Glomerella cingulata.* The Na, Cu, and Hg compounds proved unsafe for use on apple, peach, or bean. Of the Ag compounds, only the butyl was injurious to apple, peach, and bean. Of the Fe compounds, all were safe for apple and bean but the methyl compound caused injury to peach on exposure to weathering. Of the Zn compounds, the methyl was injurious to bean but not to apple or peach, whereas the ethyl compound caused injury to peach and bean and the butyl compound was not injurious to any of these plants. The Pb compounds were not injurious to any of the species tested. Considering safety and fungicidal properties as well as tenacity, the most promising compounds were the Fe and Pb dimethyldithiocarbamates. Preliminary field tests with both these sprays on apple, peach, and cherry varieties indicated them to be promising materials for controlling apple scab and peach scab but not for cherry leaf spot.

A promising new soil amendment and disinfectant, W. Carter. (Univ. Hawaii). (*Science, 97* (*1943*). *No. 2521, pp. 383–384*).—Preliminary data from the use of a mixture of 1,3-dichloropropylene and 1,2-dichloropropane ("D–D mixture") show promise in filling the need for a low-cost disinfectant which can be applied as an insurance to soils suspected of harboring organisms injurious to plants, successful results having been obtained with vegetables in root and knot-infested soil and in pineapple fields where a complex including *Anomala* beetle larvae, nematodes, and pythiaceous fungi has resulted in serious plant failure.

On the value of Spergon for seed treatment in small-grain crops, A. W. Henry (*Phytopathology, 33 (1943), No. 4, pp. 332–333*).—In field tests at several Alberta points (Canada, 1941) seed treatment, a week before seeding, with Spergon at 2 oz. per bushel gave effective control of wheat bunt but was unsatisfactory for oats covered smut as compared with Ceresan or formaldehyde. Results with clean flaxseed indicated Spergon to be beneficial to both emergence and yield.

Alternaria sp. on grain kernels killed by high temperature storage, E. Brown and A. L. Robert. (U S. D. A.). (*Phytopathology, 33 (1943), No. 4, pp. 333–335, illus. 1*).—During the seed-germination period of 3–7 days, *Alternaria* sp. (*A. tenuis* group) developed on wheat, oats, and barley kernels stored at 36° and 50° F., but not on those stored at 105°.

Breeding for disease resistance in wheat, oats, barley, and flax, E. R. Ausemus. (Minn. Expt. Sta. coop. U. S. D. A.). (*Bot. Rev., 9 (1943), No. 4, pp. 207–260*).—Following brief general discussions of the diseases of wheat, oats, barley, and flax, physiologic specialization and hybridization of the pathogens, prevalence and distribution of races, and types of resistance, this comprehensive review (269 references) takes up breeding for resistance studies of 17 specific diseases of these crop plants, with a summary of the accomplishments.

Physiologic races of Ustilago nigra, V. F. Tapke. (U. S. D. A. and [N. Y.] Cornell Expt. Sta.). (*Phytopathology, 33 (1943), No. 4, pp. 324–327*).—Seven distinct races of the seedling-infecting barley loose-smut fungus (*U. nigra*) were found in 168 collections from 23 States. The frequency of their occurrence and their distribution by States are tabulated. One of these races (No. 4) occurred more frequently than all others combined. It is identified by the same reaction of the differential varieties that identified a previously described race of covered smut (*U. hordei*), which also occurred in over half the collections of that smut.

The examination of cereal seeds for disease and studies on embryo exposure in wheat, H. W. Mead, R. C. Russell, and R. J. Ledingham (*Sci. Agr., 23 (1942), No. 1, pp. 27–40, illus. 5*).—Of a total of 817 samples of small grain seed grown in Saskatchewan, none of the wheat samples examined by routine laboratory tests, and only a few of those of oats and barley, showed significant amounts of smut as determined by surface washings. Embryo exposure was prevalent, especially in some varieties. Only a small amount of smudge was noted for the wheat and barley seed. A few minor seed troubles were recorded. Wheat samples with a high percentage of embryo exposure proved susceptible to mold growth on subsequent heating under suitable conditions, but those with high and low exposure did not give wide differences in field tests except where formalin treatment had been used. Differences were more noticeable where soil moisture was limited, and the mercury dusts tended to increase emergence and yields in some cases. Tests at Saskatoon under conditions of limited soil moisture showed a reduction in yield for the seed having high embryo exposure both for the mercury treated and the control plats, but a similar comparison did not reveal wide differences in emergence.

The development of physiological races of Puccinia graminis tritici singly and in association with others, I. A. Watson (*Linn. Soc. N. S. Wales, Proc., 67 (1942), pt. 5–6, pp. 294–312, illus. 17*).—When Marquis, Arnautka, Vernal, and Einkorn wheat varieties were inoculated with races 17, 19, 34, 56, and 147 there were no significant interactions between variety and races, though races

17 and 147 caused significantly fewer infection centers than races 19 or 56. Using a technic devised for studying a competitive effect when several races are associated in culture, race 34 always grew well and maintained itself or increased in percentage of the mixture when associated with 1–4 other races, but race 147 was always virtually eliminated after several urediospore generations. Temperature influenced the variety on which a mixture was grown and in this way affected its final composition. Thatcher wheat, when inoculated with a mixture of races 17, 19, 34, 56, and 147, effectively screened out 4 of the 5 races after four generations, leaving a pure culture of race 34. A large number of races were inoculated into susceptible border rows of a field rust nursery in 1939 and 1940, but less than half reached epidemic proportions. Race 15 was not isolated in 1939, but was found in 1940 on F_3 lines pure breeding for the Kenya 745 type of resistance. There are 29 references.

Razas fisiologicas de Puccinia triticina y P. graminis tritici communes en Chile [Physiologic races of P. triticina and P. graminis tritici common in Chile], J. Vallega ([*Chile*] *Min. Agr. Bol. Téc. 3* (*1942*), *pp. 32, illus. 3; Eng. abs., pp. 28–29*).—From infected material collected in various parts of Chile (1940), *P. graminis tritici* races 14, 15, 17, and 11 were collected, the first being most virulent. This finding agrees with the author's data of 1938, showing the number of races to be limited and no important recent change in the populations of this parasite. With respect to *P. triticina*, race 68 was most prevalent and widely distributed. Races 15 and 114 were also present, the latter a new and highly virulent one. The typical reactions of seedling wheat of the 8 differential varieties to the new race were: Malakof 4, Carina 4, Brevit 4, Webster 2–3 (intermediate or variable), Loros 4, Mediterranean 4, Hussar 4, and Democrat 4. Though the same races of stem and leaf rusts occur in Chile and the La Plata region, none of the Chilean races of *P. triticina* have thus far been found in Argentina, Uruguay, or Brazil. None of the wheat varieties grown in Chile have proved resistant to all races of these rusts present there, but in this material there are many rust-resistance factors which may be available for breeding purposes. The reactions of the more important varieties tested are given.

Reaction of some varieties and strains of winter wheat to artificial inoculation of loose smut, I. M. Atkins. (U. S. D. A. and Tex. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35* (*1943*), *No. 3, pp. 197–204*).—None of the commercial hard red winter wheat varieties among the large number tested in field inoculations (1938–41 at Denton, Tex.) by the Moore vacuum spore-suspension method proved resistant to loose smut. Pawnee, a new variety now ready for distribution by the Nebraska Experiment Station, was completely resistant like its Kawvale parent, and several Hope hybrid selections were resistant to both loose smut and leaf and stem rusts. Kawvale, Forward, Purdue No. 4, Leap, Zimmerman, Purplestraw, Early Premium, and Minhardi were resistant to smut throughout, and a number of other varieties were resistant for shorter periods and so require further testing to establish their reactions. A large number of Hope×Mediterranean selections developed in Texas combined resistance to loose smut and stem and leaf rusts. It is suggested that these strains and Kawvale provide the best adapted and most resistant parental material for the Texas breeding program. Preliminary tests had shown that heads were best inoculated at the early to midanthesis stage and that the work could be done at any time of day regardless of the air humidity.

The relative importance, from the pathological standpoint, of two types of smudge on wheat kernels, R. C. Russell (*Sci. Agr., 23* (*1943*), *No. 6, pp. 365–375, illus. 2*).—Two types of smudge (dark brown discolorations of the kernels) are described as distinguishable by visual examination. The data presented indicate that the "mild" type (cause undetermined) is pathologically rather unimportant, discoloration centering on the embryo and not appearing on the ventral side of the seed. The "severe" type, with discoloration darker and not extending so far from the tip of the kernel where it appears on both dorsal and ventral sides, is associated with *Helminthosporium sativum*, a vigorous parasite of wheat seedlings. It is estimated that about nine-tenths of the smudge occurring on wheat in Saskatchewan is of the mild type. Remarkably good control of seedling blight was obtained by Ceresan treatment of seed affected with severe smudge. No evidence was found to indicate that smudge resulted in the mature crop grown from affected seed.

A leaf spot of grasses caused by a new species of Phleospora, J. R. Hardison and R. Sprague. (U. S. D. A. et al.). (*Mycologia, 35 (1943), No. 2, pp. 185–188, illus. 2*).—*P. graminearum* n. sp. is described from living leaves of *Agropyron repens* and *Elymus canadensis*.

Diseases of dent corn in Indiana, A. J. Ullstrup. (Coop. U. S. D. A.). (*Indiana Sta. Bul. 280 (1943), pp. 20, illus. 13*).—Pertinent facts, including control, are presented for some 16 diseases.

How to get better cotton yields in 1943 by seed treatment, K. S. Chester and W. W. Ray (*Oklahoma Sta. Cir. 109 (1943), pp. 8, illus. 3*).—Includes seed treatment recommendations for 1943, with details of construction and operation of seed-treating machines.

A note on determinations of physiological specialisation in flax rust, W. L. Waterhouse and I. A. Watson (*Roy. Soc. N. S. Wales, Jour. and Proc., 75 (1942), pt. 3, pp. 115–117, illus. 2*) —Determinations of 10 collections of *Melampsora lini* from widely separated areas in Australia indicated but one race present, this one differing from any recorded to date.

The association of Rhizoctonia bataticola with retting flax in South Australia. D. B. Adam and J. Stokes (*Linn. Soc. N. S. Wales, Proc., 67 (1942), pt. 5–6, pp. 313–317*).—The sclerotial fungus described on retting flax was most evident at 90° F., but also, though not freely, on flax being "dew retted" in the field. When it develops vigorously it rapidly causes "over-retting" and destroys the quality of the fiber. On the basis of morphological, physiological, and pathological characters, the fungus is referred to *R. bataticola*. It is considered to be a natural element in some and possibly in a wide range of South Australian soils.

A Botrytis disease of lupines, J. L. Weimer. (Ga. Expt. Sta. coop. U. S. D. A.). (*Phytopathology, 33 (1943), No. 4, pp. 319–323, illus. 1*).—A disease of lupine (*Lupinus angustifolius*) occurring at Tifton, Ga., and Gainesville, Fla., following rather severe freezing injury, was found due to a *Botrytis* of the *B. cinerea* group. Inoculations proved that freezing injury is unnecessary for infection, but the fungus can attack this host much more readily if a saprophytic start is obtained, hence frozen tissue provides an excellent infection court.

Report of the Seed Potato Certification Committee, Potato Association of America, M. Koehnke et al. (*Amer. Potato Jour., 20 (1943), No. 3, pp. 65–66*).

The influence of crop rotations on the occurrence of scab, Rhizoctonia, and Fusarium wilt in potatoes under dry-land conditions in western Nebraska, R. W. Goss and J. E. Livingston. (Univ. Nebr.). (*Nebr. Potato Impr. Assoc. Ann. Rpt., 22 (1941), pp. 22–27*).—These three diseases are said to be the important soil-borne infections in western Nebraska. Records (10 yr.) from rotation plats showed less than half as much scab and *Rhizoctonia* on potatoes from the 3-yr. rotations as on the continuous potato plats, and no significant advantage of the 5-yr. over the 3-yr. rotation in scab control. Data over a 7-yr. period indicated that in 6 yr. the amount of *Fusarium* wilt in the 3-yr. rotations was less than in the continuous potato plats. The crop preceding potatoes in dry-land rotations appeared to be less important than the length of the rotations. In general, these diseases were worse with irrigation than under dry-land conditions, and the differences due to rotations were thus more evident.

Yield losses caused by leaf roll of potatoes, H. C. Kirkpatrick and F. M. Blodgett. (*Cornell Univ.*). (*Amer. Potato Jour., 20 (1943), No. 3, pp. 53–56*).—Study of a total of eight lots of data for 1942 on losses due to leaf roll confirms the opinion that healthy hills adjoined by infected plants on one or both sides compensate in part for the low yield of the latter, the gain of a healthy plant with leaf roll plants on both sides about doubling that of one with an affected plant on one side only. Detailed results are also presented in tabular and equation forms, following the method of Blodgett (E. S. R., 85, p. 774).

Location and movement of the causal agent of ring rot in the potato plant, W. A. Kreutzer and J. G. McLean (*Colorado Sta. Tech. Bul. 30 (1943), pp. 28, illus. 5*).—Infection of cut surfaces of tubers by *Phytomonas sepedonica* was reduced by apparent suberization and cork formation within a 24- to 48-hr. period. Removal of a layer of tissue 5 mm. thick from the cut ends of knife-inoculated tubers greatly reduced resultant infection, and painting the unbroken tuber surfaces with a bacterial suspension gave no infection in resultant plants in greenhouse trials and only slight infection in the field, but painting the injured surfaces gave a relatively high degree of infection. Subjecting knife-inoculated tubers to various disinfectants gave no effective control.

Tubers with typical ring rot symptoms produced infected sprouts earlier than did artificially inoculated tubers or those naturally infected but which showed no symptoms. Lower portions of diseased vines from both naturally and artificially infected tubers usually contained greater numbers of the bacteria than did upper portions, and *P. sepedonica* was more frequently found in roots than in stolons. Some vines of severely infected plants showed only slight infection or none, and tubers were harvested from such plants which produced growth free from infection. Migration of *P. sepedonica* occurred principally in the xylem but was frequently accompanied by escape into the adjourning parenchyma. Infected tubers with or without recognizable symptoms of ring rot and uninfected tubers were produced by affected plants. Tubers showing no symptoms frequently failed to reveal the presence of *P. sepedonica* when tested by the gram stain but later produced infected vines, and in other tubers showing no symptoms the organism was encountered frequently at one point only in the vascular cylinder. However, tubers showing ring rot symptoms gave a gram-positive stain reaction and if they did not rot invaribly produced diseased vines. Infection in tubers stored at 40° F. was more accurately detected by the use of ultraviolet light than in those stored at 70°.

Neither pure cultures nor material from the necrotic, yellow rings of affected tubers caused soft rot in healthy tubers when used as inoculum, but soft rot was induced by material from tissues of tubers which had undergone complete break-down. Slices from tubers infected with *P. sepedonica* when inoculated with *Erwinia carotovora* tended to rot more rapidly than similarly inoculated slices from tubers free from such infection. Mixed inocula from cultures of both *P. sepedonica* and *E. carotovora* did not increase soft rotting of healthy tuber slices over the latter alone. In aerial inoculation studies it was observed that *P. sepedonica* moved more rapidly in tomato than in potato plants. In all cases the movement of the organism was downward, except where the stem had been completely removed and a new terminal shoot produced, when the bacteria were usually found in the tissues of the new shoot. Bacterial movement both upward in the plant from infected seed pieces and downward from aerial inoculations was extremely slow.

A new root-dip treatment for sweet potato sprouts to control wilt, T. F. Manns. (Univ. Del.). (*Peninsula Hort. Soc.* [*Del.*] *Trans., 56* (*1942*), *pp. 80–81*).—In 1942 tests better stands and yields were obtained with Spergon than with Improved Semesan Bel or Yellow Cuprocide, and evidence of growth stimulation from Spergon was observable on the plants for several weeks after transplanting.

Stem rust on Triticum timopheevi, H. Hart. (Minn. Expt. Sta.). (*Phytopathology, 33* (*1943*), *No. 4, pp. 335–337, illus. 1*).—In 1942 *T. timopheevi*, usually considered rust resistant, had 35 percent stem rust in certain plats at St. Paul, Minn. Race 15B of *Puccinia graminis tritici* was identified in all rust collections.

Tobacco diseases, W. D. Valleau, E. M. Johnson, and S. Diachun (*Kentucky Sta. Bul. 437* (*1942*), *pp. 60, illus. 34*).—Following brief general discussions of the causes of tobacco diseases and the soil in relation thereto, this manual considers in detail the causes, symptoms, and preventive or control measures for physiological, plant-bed, and virus diseases, and those primarily affecting the roots, leaves, and stalks. There are also sections on lightning injury and house burn and on seed treatment and general control recommendations.

Fungicidal tests on blue mold (Peronospora tabacina) of tobacco, E. E. Clayton, T. E. Smith, K. J. Shaw, J. G. Gaines, T. W. Graham, and C. C. Yeager, Jr. (U. S. D. A. and Ga. Coastal Plain, N. C., S. C., and Md. Expt. Stas. et al.). (*Jour. Agr. Res.* [*U. S.*], *66* (*1943*), *No. 7, pp. 261–276, illus. 4*).—Used as sprays, emulsified oils differed greatly in their effectiveness for tobacco downy mildew control. Soybean, linseed, cottonseed, tung, oiticica, and peanut oils were strongly fungicidal, but olive, castor, palm, coconut, chaulmoogra, tallow, pine, and paraffin oils proved ineffective. Fungicidal properties were apparently associated with linoleic, linolenic, eleostearic, and licanic glycerides. Leaves sprayed with a fungicidal oil showed numerous oil globules in their intercellular spaces and were then resistant to fungus invasion. A mixture of cottonseed or other fungicidal oil with a Cu compound gave more effective control than the oil alone. Copper oxide alone was almost completely ineffective. The only emulsifiers proving satisfactory with Cu and oil mixtures were a few of the complex sulfonated alcohol type. In seeking fungicidal substitutes for either or both Cu and oil, 122 organic compounds were tested. The salicylates exhibited strong fungicidal values, the most effective being benzyl salicylate with oil and bismuth salicylate without oil. Cuprous oxide inhibited the germination of spores at one-eighth spray strength, bismuth salicylate was only one-fourth to one-sixteenth as toxic as cuprous oxide, and cottonseed oil was nontoxic at full spray strength. The spore-germination tests thus gave no indication of the disease-control value of the several sprays as shown by previous experiments.

Relation between frogeye and greenspot of tobacco, S. Diachun, W. D. Valleau, and E. M. Johnson. (Ky. Expt. Sta.). (*Ky. Acad. Sci. Trans., 9* (*1942*), *No. 4, pp. 90–92*).—From comparisons of isolates and from inoculation tests, it is concluded that frogeye on growing and cured Burley tobacco and green spot on cured tobacco are induced by the same fungus *Cercospora nicotianae*, but under different environal conditions.

Basic amino acids in strains of tobacco mosaic virus, C. A. Knight (*Jour. Amer. Chem. Soc., 64* (*1942*), *No. 12, pp. 2734–2736*).—Analyses by two methods of seven preparations of tobacco mosaic virus indicated that it contains 9.2±0.1 percent of arginine, and a similar amount was found in the Holmes masked, Holmes ribgrass, and J14D1 strains. On the other hand, the green and yellow aucuba strains contained 10 percent and the cucumber viruses 3 and 4, 8.7 percent of arginine. No histidine could be detected in seven of eight strains, but about 0.55 percent was found in the ribgrass strain. Indirect analyses indicated that the eight strains studied contained a small amount of lysine, but this finding has not yet been verified.

Studies on genotypes of tobacco resistant to the common-mosaic virus, H. H. McKinney. (U. S. D. A.). (*Phytopathology, 33 (1943), No. 4, pp. 300–313*).—In studies of several collections of mosaic-resistant tobacco from Colombia, South America, particular attention was given to an especially resistant collection, T. I. 448, Sel. A. Resistance to this virus was found to increase with age of plant. Even in young plants the level of virus production was very low, and as they developed the new tissues eventually showed no signs of virus, leaving the upper one-third to one-fourth of the mature plant virus-free. Virus-containing tissues rarely showed signs of disease and mosaic mottling never occurred.

A preliminary description of preparations of some of the viruses causing tobacco necrosis, F. C. Bawden and N. W. Pirie (*Brit. Jour. Expt. Pathol., 23 (1942), No. 6, pp. 314–328, illus. 1*).—The authors describe the purification of six separate cultures of tobacco necrosis viruses (labeled Potato, Princeton, Tobacco VI, Rothamsted, Tobacco I, and Tobacco II). The last two are believed identical; the others differed in their properties, though inducing identical symptoms in tobacco and bean. The first three shared antigens but were serologically unrelated to the others, suggesting that the disease can be caused by different viruses, each of which may occur in a number of strains. On precipitation with $(NH_4)_2SO_4$ the products from four cultures behaved systematically: Rothamsted gave an amorphous precipitate and Princeton showed anisotropy of flow but no recognizable crystals, whereas Potato crystallized as thin lozenge-shaped plates and Tobacco VI as hexagonal prisms. Tobacco I and II, for unknown reasons, crystallized in a variety of forms. The materials isolated from all the cultures of tobacco necrosis seemed to be essentially nucleoproteins. An addendum by A. G. Ogston briefly presents data from examination of seven tobacco necrosis viruses in the ultracentrifuge.

Seedling blight of carrot caused by Alternaria radicina, I. Mounce and J. E. Bosher (*Sci. Agr., 23 (1943), No. 7, pp. 421–423, illus. 1*).—Seedling blight and black rot of carrot due to *A. radicina* are reported from British Columbia. The rot developed in roots inoculated with mycelium isolated from infected seedlings. The disease was found to be seed-borne and readily controlled by seed treatment (Semesan Junior, New Improved Ceresan, and Spergon).

Manifestation extrême de la gerçure des pétioles du céleri—maladie par carence de bore [Extreme manifestations of cracking in celery petioles—a boron deficiency disease], R. O. Lachance, P. Bertrand, and C. Perrault (*Sci. Agr., 23 (1942), No. 3, pp. 187–193, illus. 5; Eng. abs., p. 193*).—The authors describe an atrophy of celery hearts, due to boron deficiency, which they consider as an extreme symtom of the cracking of the petioles. The symptoms varied according to whether the deficiency was more or less pronounced, in their order of gravity being cracked petioles, dwarfing of the plant, and atrophy of the heart. There appeared to be a relation between incorporation of calcareous amendments and the development of cracking. Applications of borax to the soil corrected these abnormalities under the test conditions.

Dominio de las enfermedades mas comunes del tomate en Puerto Rico [Control of the more common tomato diseases of Puerto Rico], L. A. Alvarez (*Agr. Expt. [Puerto Rico Univ. Sta.], 3 (1943), No. 1, pp. 7–10*).

Metodo conveniente para desinfeccion de semilla de tomate [Suitable methods for disinfecting tomato seeds], A. Riollano (*Agr. Expt. [Puerto Rico Univ. Sta.], 3 (1943), No. 1, pp. 6–7*).

Defoliation of tomato plant as a response to gaseous emanations from the fruit, J. Skok. (Univ. Ill.). (*Bot. Gaz., 104 (1943), No. 3, pp. 486–489*).—The observational and experimental evidence presented renders it probable that gaseous emanations from ripe fruits on the vines are a major contributing factor in the defoliation of tomato plants under commercial field culture. On the basis of what is known about such emanations and on additional experimental data, ethylene may be one of the principal compounds involved.

Chlorosis in tomatoes, B. T. Cromwell and J. G. Hunter (*Nature [London], 150 (1942), No. 3812, pp. 606–607*).—Observational and experimental data led to the conclusion that the chlorosis reported at Auchincruive, Ayr, Scotland, last season was caused by a temporary deficiency of Mg in the leaves due to physiological drain from the mature leaves to the fruit and immature leaves. Poor root action and lack of balance between K and Mg ions in the soil appeared to be contributory factors.

A virus disease of tomato new to Maryland that resembles tip-blight, M. W. Woods and C. E. Cox. (Univ. Md.). (*Peninsula Hort. Soc. [Del.] Trans., 56 (1942), pp. 69–70*).—Tomato tip blight, due to a strain of the spotted wilt virus, appears to have been found this past season both in West Virginia by Leach and Berg (E. S. R., 87, p. 680) and in Maryland by the authors. Diagnosis of the latter cases rests on symptoms in tomato and inoculated pepper and tobacco; further tests must be made before the identity of the virus can be established with certainty.

Virus diseases of stone fruits, S. M. Zeller. (Oreg. Expt. Sta.). (*Oreg. State Hort. Soc. Ann. Rpt., 34 (1942), pp. 85–90, illus. 2*).—The author briefly discusses the western X disease of peach, buckskin of cherry and peach, and other cherry virus diseases.

Spread of virus diseases of stone fruits in Oregon, J. R. Kienholz. (U. S. D. A.). (*Oreg. State Hort. Soc. Ann. Rpt., 34 (1942), pp. 58–61*).—Three years' records in a 20-acre peach orchard showed an increase of 71.5 percent in the number of cases of the western X disease. Brief notes are also given on the spread of cherry virus diseases and on control practices for fruit tree viruses.

Experiments on the control of brown rot of cherries and peaches, 1942, including notes on brown rot control in apricots, S. M. Zeller, C. E. Owens, and A. W. Evans (*Oreg. State Hort. Soc. Ann. Rpt., 34 (1942), pp. 53–57*).—This is a progress report for 1942 on tests with copper and lime-sulfur fungicides and Fermate for control of brown-rot blossom and twig blight on peaches, in which Fermate gave promise in comparison with the older materials. Because of weather conditions the results with sweet cherries were less satisfactory, and the only plats giving indications of control were those where lime-sulfur and Fermate had been applied. Brief notes are included on the timing of the spray and dust treatments and on control for apricots.

Les maladies du pêcher et de l'amandier [Diseases of peach and almond trees] (*[Morocco] Dir. Prod. Agr., Com. et Ravitaillement, Memento 60 (1941), pp. 17, illus. 9*).—A brief conspectus for Morocco, including symptoms and control.

Effect of carbon dioxide and temperature on the decay of sweet cherries under simulated transit conditions, H. English and F. Gerhardt. (U. S. D. A.). (*Amer. Soc. Hort. Sci. Proc., 40 (1942), pp. 172–176, illus. 1*).—Experiments with *Sclerotinia fructicola* and *Penicillium expansum* clearly indicate that brown rot and other kinds of decay of sweet cherries can be inhibited by CO_2 at concentrations within the range encountered in commercial shipment. The interrelationship of temperature and CO_2 concentration is also emphasized; e. g., a gas concentration effective in controlling decay at 36° F. may be totally ineffective at 45°. The results suggest that if the temperature in refrigerator cars were maintained close to 31° the decay of sweet cherries in transit could be effectively controlled without the CO_2. The fungistatic effect of CO_2 was demonstrated from examination of the fruit at the time of removal from storage and again after 2 days at 65°.

Pollenicides as supplements for bactericides in blossom blight control, E. M. Hildebrand and L. F. Hough. (Cornell Univ.). (*Amer. Soc. Hort. Sci. Proc., 40 (1942), pp. 91–94*).—Elgetol and Nitrokleenup, the pollenicidal materials used in these preliminary experiments, are said to be practically nonbactericidal at the strengths employed and to repel pollinating insects by making the floral organs unattractive. It appears, further, that the pollenicide acts on the tree by inactivating the pollen on exposed parts of the stigmas and anthers and also by killing the outer portions of these organs. Shriveling of the floral organs in advance of the bacteria thus eliminates these organs as courts of infection for the fire blight bacteria. Pear and apple trees, most susceptible to fire blight while young, are being tested for removal of all the blossoms until they attain sufficient size for commercial crops, with promising results.

Further progress in breeding strawberries for resistance to red stele, W. F. Jeffers. (Univ. Md.). (*Peninsula Hort. Soc. [Del.] Trans., 56 (1942), pp. 70–71*).—See also a previous note (E. S. R., 87, p. 241).

Early diagnosis of magnesium deficiency in citrus, B. R. Fudge. (Fla. Expt. Sta.). (*Fla. State Hort. Soc. Proc., 55 (1942), pp. 17–21, illus. 4*).—The data presented indicate that it is possible to anticipate the appearance in the fall of a deficiency of Mg in the foliage by analyzing the spring flush of growth as late as April. It should thus be possible, by amending any deficiency indicated, to prevent the impending development of symptoms. However, the practical use of this information is limited by the lack of a rapid and at the same time reliable method for determining Mg. Until this can be done the best course is probably to incorporate Mg in mixed fertilizer on a unit basis in what may be considered a maintenance program that will control the deficiency.

Identification of psorosis in the citrus nursery, H. E. Stevens. (U. S. D. A.). (*Fla. State Hort. Soc. Proc., 55 (1942), pp. 45–51, illus. 3*).—This is a brief summary of the present status of psorosis, including information on its probable virus nature, the general characteristics and leaf symptoms, control, and a summary of the author's recent experiments relative to the influence of rootstocks on the development of the disease.

Prevention of stem end rot, C. Brooks. (U. S. D. A.). (*Fla. State Hort. Soc. Proc., 55 (1942), pp. 61–69, illus. 9*).—The author concludes from data presented that, although there is still much to be desired in methods for preventing stem end rot of oranges, much can be accomplished with what is already known. Avoidance of careless and excessive ethylene treatments is shown to be highly important, and where it is feasible to do so they should be omitted altogether. Borax has proved the most satisfactory known disinfectant for controlling the trouble, and if ethylene is deemed necessary to secure a marketable color its use should precede the gas treatment. Where borax treatment does not fit into packing-house plans, a sodium-*o*-phenylphenate is suggested for limited trial where accurate control of temperature and concentration can be maintained to avoid injury to the peel.

Factors affecting sugar spotting in dates, G. L. Rygg. (U. S. D. A.). (*Date Growers' Inst. Rpt., 19 (1942), pp. 10–12*).—Physiological studies led to the conclusion that sugar spotting may be delayed or prevented by proper moisture control, low temperatures, or by a combination of both. Moisture content of about 22–33 percent should be avoided unless a low storage temperature is used.

Current investigations on walnut blight and recommendations for its control in war-time, P. W. Miller. (U. S. D. A. and Oreg. Expt. Sta.). (*Oreg. State Hort. Soc. Ann. Rpt., 34 (1942), pp. 142–146*).—Of the 40 different fixed copper materials tested during the past 10 yr. in the search for a bordeaux substitute which would control bacterial blight without foliage injury, copper oxalate and yellow cuprous oxide had given sufficiently promising results to warrant further trial. Results in 1942 confirmed the finding that the oxide as a spray is practically as effective as bordeaux if a sufficient number of well-timed applications are made and thoroughly applied. Used as a dust, it also compared favorably. A 25-percent copper-lime dust appeared to have been more effective than 10-percent yellow cuprous oxide dust but must be applied when the foliage is moist. It is believed that the latter would give satisfactory results with a greater number of heavier applications. Suggested changes in control recommendations to conserve critical war materials are presented.

Fusarium wilt of carnations caused by Fusarium dianthi Prill. et Del., J. M. Bickerton (*[New York] Cornell Sta. Bul. 788 (1942), pp. 31, illus. 8*).—*F. dianthi* wilt, the symptoms of which are described, is a distinct and serious disease on Long Island. The pathogenicity of the fungus was established and inoculations of numbers of commercial varieties of carnations have shown marked differences in susceptibility. Infested soil in the greenhouse and field is probably the main source of infection, other important sources being infected cuttings and plants. *F. dianthi* is able to survive two Long Island winters in the soil. Roots are the principal infection courts, though the fungus may also enter through wounds at the base of the main stem. At 70°–80° F. the latent period of infection was 12–28 days for stem-wound inoculations and 23–45 days for root inoculations. At 50°–65° this period lengthened to 41 days and 56–75 days, respectively. The pathogen at first extends upward in the xylem, but gradually grows into the pith on one side and the cambium, phloem, and cortex on the other. The cardinal temperatures in culture are approximately 80°, 43°, and 97°. Temperatures around 75°–80° increased the amount of infection in root inoculations, shortened the incubation period, and increased the rate of killing of infected plants; lower temperatures had the reverse effects. Selection of healthy cuttings, use of resistant varieties, and growing plants in new field and bench soil are recommended. In addition, the severity of the disease on susceptible varieties grown in infested soil is appreciably decreased and flower production increased by soil disinfection with formaldehyde or chloropicrin. In the field, susceptible varieties should be grown in new or well-rotated soil.

Coming up-to-date on Verticillium wilt and Septoria leafspot of chrysanthemums, A. W. Dimock. (Cornell Univ.). (*Chrysanthemum Soc. Amer. Bul., 11 (1943), No. 1, pp. 3–10*).—A general summary of present knowledge on these two diseases, including recent findings with respect to sprays for *Septoria* leaf spot.

Fusarium yellows or Sclerotinia dry rot? R. Nelson. (Mich. Expt. Sta.). (*Gladiolus Sup. [New England Gladiolus Soc.], 7 (1943), No. 1, pp. 2–6, illus. 5*).—*Fusarium* yellows and *Sclerotinia* dry rot of gladiolus are differentiated by comparison of their chief symptoms.

Longevity of congelations of bulb nematode, Ditylenchus dipsaci (Kuhn) Filipjev, from narcissus, R. J. Hastings (*Sci. Agr., 23 (1942), No. 1, pp. 1–3*).—Mortality of the nematodes in the congelations was influenced by the length of dormancy. Thus after 1 yr. it averaged 20, 2 yr. 85.7, 3 yr. 95.5, and 4 yr. 100 percent. The revival rate was also in direct relation to length of dormancy, 1-yr. congelations commencing to show motility in 2–3 hr. and those of 2 yr. in

3–4 hr., and both attaining maximum revival in 24 hr. Three-yr. congelations showed motility in about 6 hr. and maximum revival in 48–72 hr. These congelations from narcissus survived a relatively short time (3 yr.) as compared with the bulb nematode in dried tissues of other crops (2–9+ yr.).

Scab of poinsettias, G. D. Ruehle. (Fla. Expt. Sta.). (*Fla. State Hort. Soc. Proc., 55 (1942), pp. 120–121, illus. 3*).—In addition to a brief discussion of the symptoms and present status of this *Sphaceloma* scab disease previously noted (E. S. R., 87, p. 244), comparisons of the fungus in culture with other species of the genus are reported as showing it to be a new species, the technical description of which is referred to in the following entry. Spray tests with copper fungicides indicated that the disease can be controlled only if applications are continued through most of the season to keep the new growth covered. Fortunately at least one strain of double red poinsettia has been found that appears to have a high degree of resistance.

A new species of Sphaceloma on poinsettia, A. E. Jenkins and G. D. Ruehle. (U. S. D. A. and Fla. Expt. Sta.). (*Biol. Soc. Wash. Proc., 55 (1942), pp. 83–84*).—A technical description of *S. poinsettiae* n. sp., causing scab on leaves and stems of *Euphorbia pulcherrima plenissima* in Hawaii and Florida and observed once on *E. poinsettia* in Florida but none on the horticultural variety *albida*.

Further studies on the effects of several spray materials on the apparent photosynthetic rate of greenhouse roses, M. T. Fossum and A. Laurie. (Ohio Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 40 (1942), pp. 77–78, illus. 1*).—In continuation (E. S. R., 87, p. 226), tests with the proprietary spray materials Rotogreen, NNO, and NNOR (the last two being technical mannitan monolaurate) appeared to indicate that the initial reductions in the apparent photosynthetic rate must have been due in part to mechanical injury from applying them. Of the various materials tried under the given greenhouse conditions, the technical mannitan monolaurate alone or with rotenone has shown the least effect on CO_2 assimilation, and NNOR has proved most effective against red spider.

Black-spot on rose canes, E. W. Lyle. (Tex. Expt. Sta.). (*Amer. Rose Ann., 1943, pp. 155–156, illus. 1*).—Attention is called to the fact that infection of the canes serves as a source of spring infections, and use of fungicides well into the fall combined with spring pruning of late-formed small twigs are control practices recommended. Trials of a number of fungicides have shown better results with preparations containing both Cu and S than those with S alone, and one containing 90 percent 325-mesh dusting S and 10 percent Tennessee Copper 34 is reported to have proved satisfactory.

The black-spot war situation, L. M. Massey. (Cornell Univ.). (*Amer. Rose Ann., 1943, pp. 141–154*).—Tests conducted (1941–42) in a large commercial rose nursery, using many standard home-mixed and proprietary fungicides and including some of the newer preparations, were reasonably consistent and in general confirmatory of results obtained in earlier experiments by the author in that a number of materials were about equally effective in controlling black spot. Dusts gave slightly better control than sprays and those containing Cu were more injurious than those containing S. The 1942 tests failed to indicate any superiority of S finer than 325-mesh, although the finer materials are usually preferred. Of the new materials, Fermate gave best results. Wetters and spreaders added to the efficiency of the sprays.

Nematode resistance in rose understocks, E. W. Lyle. (Tex. Expt. Sta.). (*Amer. Rose Ann., 1943, pp. 157–158, illus. 2*).—A thornless understock, *Rosa multiflora* × *R. blanda*, is reported to be outstandingly resistant if not completely immune to root knot, and no others tested were found to approach it in this character.

A stem canker of dogwood and madrona, D. E. Stuntz and C. E. Seliskar (*Mycologia, 35* (*1943*), *No. 2, pp. 207–221, illus. 6*).—Increasing numbers of trees of Pacific dogwood (*Cornus nuttallii*) and madrona (*Arbutus menziesii*) have been found affected with serious stem cankers which the authors proved due to a fungus identified as *Phytophthora cactorum*. Several of the artificially induced cankers were scarified as a possible control measure. Insufficient time has elapsed to determine the final outcome, but thus far any further spread has been prevented.

Liste annotée des maladies parasitaires des arbres observees dans le Québec [Annotated list of the parasitic diseases of trees observed in the Province of Quebec], R. Pomerleau ([*Quebec*]*: Min. Terres et Forêts, Serv. Forest., 1942, pp. 39+*).

Forest pathology in relation to rehabilitation, A. W. McCallum (*Forestry Chron., 19* (*1943*), *No. 1, p. 39*).—A note on the employment of men returning from the armed forces in forest disease work.

White pine blister rust control in Ontario as post-war employment, J. R. Dickson (*Forestry Chron., 19* (*1943*), *No. 1, pp. 40–43*).—A brief general discussion with recommendations.

White pine blister rust control—Michigan—Annual Report, 1942, J. K. Kroeber ([*Lansing*]*: Mich. Dept. Agr., 1942, pp. 31+, illus. 2*).—See previous reports (E. S. R., 87, p. 543).

A Dasyscypha following Cronartium ribicola on Pinus monticola, I, R. T. Bingham and J. Ehrlich. (Univ. Idaho). (*Mycologia, 35* (*1943*), *No. 1, pp. 95–111, figs. 2*).—This is a detailed taxonomic study of *Dasyscypha calyciformis* and *D. agassizii*, with amended descriptions.

Wounds and decay caused by removing large companion sprouts of oaks, E. R. Roth and G. H. Hepting. (U. S. D. A.). (*Jour. Forestry, 41* (*1943*), *No. 3, pp. 190–195, illus. 4*).—Of 68 oaks of mixed species, from which companion sprouts larger than 3 in. at the base had been cut in thinning 6–12 yr. before, butt rot had entered 9 through the remaining stub or wound and 5 more showed infections that had probably entered the same way. Only one wound had closed completely. Data are also presented in connection with a planned study on the rate of healing of wounds left after the removal of oak companion sprouts and on the deterioration of girdled companion sprouts and those cut leaving a 3-ft. stub. Small wounds not only had less area to close but actually healed at a faster rate than large wounds. Most wounds were larger a year after made, due to bark dieback, even though flush cuts were made as carefully as possible. At the end of 5 yr. about half of the girdled trees and 3-ft. stubs had died back to the crotch, and callus was forming there.

Effect of invisible decay on deterioration of untreated oak ties and posts, E. R. Roth. (U. S. D. A.). (*Jour. Forestry, 41* (*1943*), *No. 2, pp. 117–121*).—In comparisons of sound ties and posts (five oak species) with those containing invisible stages of decay, yearly observations showed no superficial differences, and in both cases fruiting fungi were of the same species and mostly rotters of dead sapwood. Half of the experimental material was split for later examination, and in all cases, whether ties or posts, seasoned or unseasoned, or in place 5 or 6 yr., the pieces originally infected averaged decay to a greater extent. Only a small proportion of the identified rot fungi isolated from dissected material consisted of those originally present in the trees; all these fungi were present in both sound and infected ties and posts, but the volume of decay was usually greater in the infected than in the sound material. Seasoning untreated ties and posts cut in the fall for an 8-mo. period made very little difference in the length of time they would last.

An unusual sporophore of Trametes suaveolens produced on artificially inoculated wood, E. F. Darley and C. M. Christensen. (Minn. Expt. Sta.). (*Phytopathology, 33 (1943), No. 4, pp. 328–330, illus. 1*).—Inoculated into holes bored in fresh soft maple and green ash branch sections filled with autoclaved wheat and oats, a sporophore developed after some months which differed in position, shape, and pore size from the original one from which the culture was made, indicating that relatively small environal changes can cause considerable variation in the gross morphology of a sporophore.

A new non-helicoid bisporous Helicocephalum parasitizing nematode eggs, C. Drechsler. (U. S. D. A.). (*Mycologia, 35 (1943), No. 2, pp. 134–141, illus. 1*).—Discussion and description are devoted to *H. diplosporum* n. sp., found destroying and consuming nematode eggs in decaying leaves of bluegrass at Arlington, Va.

ECONOMIC ZOOLOGY—ENTOMOLOGY

Notes of the life history of Rocky Mountain bighorn sheep in the Tarryall Mountains of Colorado, C. C. Spencer (*Jour. Mammal., 24 (1943), No. 1, pp. 1–11, illus. 2*).—A report of observations on the life history of *Ovis canadensis canadensis*. A herd in mountains of the Pike National Forest which suffered severe losses in 1885 thought to be due to the psoroptic mite was almost destroyed in 1923–24 by an epidemic apparently of hemorrhagic septicemia, but now numbers at least 400 and is increasing. Data collected included studies on seasonal ranges, migrations, breeding habits, sex-age ratios and census, lambing habits, food preferences, predation, parasites and disease, range conditions, and conflicts. Four species of coccidia and two of stomach worms were the only internal parasites found, and the winter tick was the only external parasite.

A Wyoming bighorn sheep study, R. F. Honess and N. M. Frost (*Wyo. Game and Fish Dept. Bul. 1 (1942), pp. 127+, illus. 47*).—The information presented was obtained during a State-wide survey of the bighorn sheep in Wyoming under the Federal aid to wildlife restoration program. Articles entitled A Study of the Crystal Creek Bighorn Sheep Range, by W. J. Allred (pp. 62–87), and Biological Significance of Mineral Licks, by O. A. Beath (pp. 88–94) (Univ. Wyo.) are included.

A new trichostrongylid nematode from the stomachs of American squirrels, J. T. Lucker. (U. S. D. A.). (*Jour. Wash. Acad. Sci., 33 (1943), No. 3, pp. 75–79, illus. 17*).—*Böhmiella wilsoni*, from the stomachs of *Sciurus carolinensis leucotis*, *S. carolinensis*, and *S. niger niger* in Virginia, West Virginia, and Georgia, is described as new to science.

Two human diseases which may be contracted from Montana rodents, H. B. Mills (*Mont. State Bd. Ent. Pub. 1 (1941), pp.* [8]).—Plague and tularemia are discussed.

Effects of burning-over and raking-off litter on certain soil animals in the Duke Forest, A. S. Pearse (*Amer. Midland Nat., 29 (1943), No. 2, pp. 406–424, illus. 1*).

An investigation of the litter fauna of two types of pine forest, J. G. Hope (*Bul. Wagner Free Inst. Sci., 18 (1943), No. 1, pp. 7*).—Report is made of a study of the floor fauna of the Pine Barren region of New Jersey, which is a fairly open one of the pitch pine (*Pinus rigida*), and a comparison is made with another type, for which the stand of hemlock located along the Wissahickon Creek in Philadelphia was chosen. A list of animals collected, representing 3 phyla and 13 orders, is presented.

The management of ponds for the production of game and pan fish, H. S. SWINGLE and E. V. SMITH. (Ala. Expt. Sta.). (In *A Symposium on Hydrobiology. Madison: Univ. Wis. Press, [1941], pp. 218–226, illus. 5*).—A more extended account has been noted (E. S. R., 87, p. 694).

Problems and procedures in fish management: The Lake Carl Blackwell project of the Oklahoma Agricultural Experiment Station, J. DE GRUCHY. (Okla. Expt. Sta.). (In *A Symposium on Hydrobiology. Madison: Univ. Wis. Press, [1941], pp. 402–403*).

Introduction to parasitology, A. S. PEARSE (*Springfield, Ill.: Chas. C. Thomas, 1942, pp. 357+, illus. 448*).—This work is presented in 20 chapters, each accompanied by a list of references to the more important literature.

Lipid nerve sheaths in insects and their probable relation to insecticide action, A. G. RICHARDS, JR. (*Jour. N. Y. Ent. Soc., 51 (1943), No. 1, pp. 55–69, illus. 13*).

An evaluation of new spray equipment, K. J. KADOW and S. L. HOPPERSTEAD (Del. Expt. Sta.). (*Peninsula Hort. Soc. [Del.] Trans., 56 (1942), pp. 13–18, illus. 5*).

The standardizing of a laboratory method for comparing the toxicity of contact insecticides, F. O. MORRISON (*Canad. Jour. Res., 21 (1943), No. 3, Sect. D, pp. 35–75, illus. 13*).—In the studies reported toxicity tests were conducted with nicotine sulfate and nicotine alkaloid, using the pomace fly as the test insect, with a modified Tattersfield atomizer spray machine, and by an immersion technic.

Insecticidal aerosol production: Spraying solutions in liquefied gases, L. D. GOODHUE. (U. S. D. A.). (*Indus. and Engin. Chem., 34 (1942), No. 12, pp 1456–1459, illus. 6*).—In a new method of producing insecticidal aerosols, a solution in low-boiling solvent, such as dichlorodifluoromethane or methyl chloride, is allowed to escape under its own pressure through a nozzle. An aerosol well-adapted for the control of flies and mosquitoes in the presence of man is prepared by spraying a solution of purified pyrethrum extract and sesame oil in dichlorodifluoromethane. It is highly toxic to many species of insects and nontoxic to man, is noninflammable, and does not produce oily deposits. Other insecticides toxic to man, such as nicotine, can be applied with methyl chloride, especially for greenhouse fumigation. These aerosols are much more finely divided than the mists produced by spraying methods, and they settle more slowly.

For the purpose of studying and comparing the settling rates of mists and aerosols, a blue dye can be included in the solution and the settling rate quantitatively determined with a photometer.

The control of the Mexican bean beetle and the corn earworm on beans, C. GRAHAM and L. P. DITMAN (*Peninsula Hort. Soc. [Del.] Trans., 56 (1942), pp. 54–57*).

The relation of leaf structure to thrips resistance in the onion, C. E. PETERSON and E. S. HABER. (U. S. D. A. and Iowa Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 40 (1942), pp. 421–422*).

The present status of citrus thrips control, C. O. PERSING, A. M. BOYCE, and C. S. BARNHART. (Calif. Citrus Expt. Sta.). (*Citrus Leaves, 23 (1943), No. 3, pp. 6–7, illus. 1*).

Control of citrus aphids, J. R. WATSON. (*Fla. Expt. Sta.*). (*Citrus Indus., 24 (1943), No. 4, pp. 3, 7*).

A fungous disease of the mealybug, J. A. COX, M. L. BOBB, and W. S. HOUGH. (Va. Expt. Sta.). (*Va. Fruit, 31 (1943), No. 4, pp. 16, 18*).—Reference is made to the marked reduction of the Comstock mealybug in apple orchards in the Roanoke and Crozet areas of Virginia during the seasons of 1940, 1941, and 1942 caused by this fungus disease, reported upon by Charles et al. (E. S. R., 84, p. 791). At Winchester, where this disease did not kill a large percentage of the mealybugs in 1942, the infestation was heavier than in previous years. The observations indicate that environmental conditions favorable for the development of this fungus disease of the mealybug include a warm, humid atmosphere lasting for several days and a heavy infestation of the insect.

Fumigation experiments on the black scale. D. L. Lindgren and R. C. Dickson. (Calif. Citrus Expt. Sta.). (*Calif. Citrog., 28 (1943), No. 4, pp. 90, 98–99, illus. 2*).

Some problems of control of scale insects on citrus, W. L. Thompson. (Fla. Expt. Sta.). (*Fla. State Hort. Soc. Proc., 55 (1942), pp. 51–59*).

The pine tree emperor moth Nudaurelia cytherea capensis Stoll.: A survey and examination of the measures employed in its control, F. G. C. Tooke and C. S. Hubbard (*Union So. Africa Dept. Agr. and Forestry, Sci. Bul 210 (1941), pp. 57, illus. 12*).

A new pest of Albizzia in the District of Columbia (Lepidoptera: Glyphipterygidae), J. F. G. Clarke (*U. S. Natl. Mus. Proc., 93 (1943), No. 3162, pp. 205–208, illus. 21*).—Under the name *Homadaula albizziae* description is given of a new lepidopteron found attacking the ornamental "mimosa" (*A. julibrissin*), in the northwestern part of the District of Columbia and adjacent Takoma Park and Silver Spring, Md. Both foliage and flowers of the mimosa are sometimes severely damaged.

A fungus disease of Plutella maculipennis Curt. in South Africa, with notes on the use of entomogenous fungi in insect control, G. C. Ullyett and D. B. Schonken. (*Union So. Africa Dept. Agr. and Forestry Bul. 218 (1940), pp. 24, illus. 8*).—The use of *Entomophthora sphaerosperma* Fres. in Transvaal in combating the diamondback moth is reported upon. The development of the fungus in the host is described, and the reaction of the larva to infection is discussed. It is suggested that the difference in resistance to infection which is apparent between the earlier and later instars may be due to differences in the pH values of the blood. The effect of environmental factors upon the fungus is discussed and the importance of the humidity and temperature relationship shown. The influence of the fungus on the parasites and predators is considered. It is shown that the population of these is reduced both directly and indirectly.

Control of the corn earworm by clipping, E. M. Emmert and W. A. Price. (*Kentucky Sta. Bul. 436 (1942), pp. 10, illus. 4*).—From 1933 to 1941 clipping off the tips of the ears of sweet corn to control corn earworm was used with varying degrees of infestation and at different dates throughout the season. The time of clipping varied from 1 to 10 days after pollination, which was assumed to have taken place when most of the silks had begun to brown. Percentage of wormy ears was reduced by clipping from 4 to 6 days after pollination to less than 19 and worm damage practically eliminated. Inspection of the cut surface to make sure the worm was removed was essential, and clippings were destroyed. In a comparative test with pyrethrum-oil treatment clipping was more effective and more economical.

The use of attractants in codling moth sprays, H. E. Brown. (Univ. Mo.). (*Missouri State Hort. Soc. Proc., 1941–42, pp. 78–80*).—The addition of brown sugar to codling moth sprays (10 lb. to 100 gal. of spray) including (1) standard lead arsenate, (2) lead arsenate and summer oil, (3) Black Leaf 155 and summer oil, and (4) phenothiazine as larval attractants is briefly reported upon. This work in 1940 and 1941 supplements that of Siegler (E. S. R., 83, p. 370). In every case the brown sugar resulted in an increased control as compared with check plats except when phenothiazine was used as a stomach poison, in which there was a slight advantage in favor of the sugar plat.

Some effects of nutrition on the development of the codling moth, A. D. Heriot and D. B. Waddell (*Sci. Agr.*, *23* (*1942*), *No. 3*, *pp. 172–175*).—The findings in experimental work aimed at determination of the comparative nutritive values of seeds, pulp, and leaves of apple for codling moth larvae are reported. Immature tissues appear to have a greater nutritive value than mature tissues. An exclusive diet of immature seeds appeared to accelerate development, but seeds were not found to be essential to fertility of the moths. The absence of seeds did not appreciably retard development providing immature apple pulp was available, although a significant number of the larvae deprived of seeds underwent diapause. Mature pulp and mature seeds, both evidently unfavorable for larval growth, tended to increase larval longevity at the expense of development. On a leaf diet several larvae developed into moths which were undersized and short lived. Intermediate forms having both larval and pupal characteristics occurred only on a diet of leaves. None of the larvae that fed on petioles transformed though they lived for periods up to 42 days. No difference in nutritional value was observed between leaves picked in the morning and leaves picked in the evening.

Some responses of the malaria mosquito to light, W. R. Horsfall. (Ark. Expt. Sta.). (*Ann. Ent. Soc. Amer.*, *36* (*1943*), *No. 1*, *pp. 41–45*, *illus. 2*).—In the course of the work conducted, early accounts of which have been reported (E. S. R., 88, p. 661), it was found that malaria mosquitoes, even though their source is fairly uniform, are attracted to light traps in varying numbers as changes occur in the lunar cycle. "When the moon is full or nearly so the numbers attracted to light ebb, and when the moon is new they are attracted in greatest numbers. The trap light is more or less effective in proportion to the intensity of the light from the moon. The darker the night, the greater the area over which the trap light exerts its attractiveness and consequently the greater the numbers of mosquitoes attracted, other things being equal. Malaria mosquitoes are attracted to a light trap most abundantly near and after midnight. During nights at or near the time of the new moon this is most clearly evident. When the moon sets at midnight most mosquitoes are attracted after midnight, and when the moon rises at midnight most mosquitoes are attracted before the moon rises. During nights when the moon is full the attraction is not noticeably different before and after midnight."

The mosquitoes of Utah, D. M. Rees (*Utah Univ. Bul.*, *33* (*1943*), *No. 7*, *pp. 99*, *illus. 23*).—Nineteen species of mosquitoes of the genus *Aedes*, 3 of *Theobaldia*, 6 of *Culex*, and 3 of *Anopheles* are recognized as occurring in Utah. Included are keys to the adults and larvae, descriptions of the species, their distribution, life history, and importance. A general biological discussion and a list of 26 references to the literature follow.

Mosquitoes as vectors of Dermatobia in eastern Colombia, M. Bates (*Ann. Ent. Soc. Amer.*, *36* (*1943*), *No. 1*, *pp. 21–24*).—Observations of the human warble fly *D. hominis*, made in the course of yellow fever work in the forest zone at the base of the Eastern Andes in Colombia, where the pest is particularly common, are reported. It is a major pest of cattle in many parts of Colombia. The adult female when ready to lay eggs is zoophilous in that she is attracted to warm-blooded animals, and taking up a position on a man or a horse she seizes other zoophilous dipterons and lays her eggs on them. "From observations of the oviposition behavior and from the relative incidence of eggs on different species of mosquitoes, it would seem that the characteristics of a vector of *Dermatobia* eggs are (1) zoophilous habit, (2) diurnal flying period, (3) moderate size (for instance most tabanids would be too large to handle, *Hippelates* too small), [and] (4) moderately active habits (very sluggish insects would not stimulate the pouncing behavior to *Dermatobia*, and very active ones would escape). Both *Dermatobia* and its vectors seem to be forest insects, though *Dermatobia* will occasionally leave the forest accompanying a host. The *Dermatobia* abundance may differ strikingly from forest to forest with no obvious relation to the abundance of cattle (assumed to be the chief host) in the vicinity."

Some investigations of fly control in dairy barns, F. W. Atkeson, A. O. Shaw, R. C. Smith, and A. R. Borgmann. (Kans. Expt. Sta.). (*Jour. Dairy Sci., 26 (1943), No. 3, pp. 219–232*).—Investigations in a large modern well-situated dairy barn at the Kansas Station, where grade A milk is produced, were conducted with a view to measuring the effectiveness of a combination of various methods of fly control in dairy barns, the details being reported in tables. These include (1) comparison of screens and no screens in controlling flies in dairy barns, (2) increase in fly numbers in barns when cattle are brought in, (3) combination of spraying barns with and without screens as fly control measures, (4) comparison of numbers of flies on screens and walls, (5) barn cleanliness as a factor in fly numbers, (6) number of flies in different areas of the barn, (7) color preference of flies determined by numbers of flies on square foot areas of a wallboard hung in the dairy barn, and (8) comparison of several sprays in effectiveness of knock-down and kill. Observations on spraying methods and a list of the literature cited are included.

Numerous counts in and near several barns showed that fly control in barns is confined almost exclusively to houseflies. "Approximately one-fourth as many flies were counted in screened barns as in the same barns without screens when systematic manure disposal and daily spraying had been in progress throughout the summer. In clean barns, when spraying was regularly practiced to keep down fly numbers in addition to screening to keep out flies, the increase in fly numbers resulting from bringing in the cows was not important. In bedded barns the fly numbers were greatly increased after the cattle were brought in, possibly due to the odor of the bedding. Spraying the barn was ineffective as a fly control measure in a bedded barn unless the barn was screened. A combination of screens and spraying resulted in effective control. The trapping effect of screens and the tendency of flies to migrate to light were shown by the fact that nearly 5 times as many flies were found on the screens as on the wall in a bedded barn, while more than 11 times as many were found on the screens in a clean barn. This indicates the possible supplemental value of such control practices as darkened windows, screen traps, and electric screens. The importance of clean floors and the olfactory response of flies were shown by the fact that about 8 times as many flies were counted on the ceiling and walls on the bedded side of a barn as were found on the clean side (floor scrubbed) of the same barn. The repellent effect of fresh lime on floors was shown by the fact that on a floor freshly limed approximately one-third as many flies were counted as on a floor swept only in the same barn. The attraction of flies to even slightly soiled floors was shown by the fact that there were significantly larger numbers of flies on floors limed the previous day than on freshly limed floors. In a scrubbed barn the numbers of flies found on an unscrubbed (swept) feed alley and the numbers on a scrubbed feed alley did not indicate much advantage in scrubbing the feed alley. Unscrubbed mangers soiled with feed and saliva, however, had 18 times as many flies on them as were on the scrubbed mangers. Numerous counts on ceilings and walls showed that flies are more numerous on the ceilings and particularly on the sides of ceiling beams. Study of color preference by flies showed that the flies preferred the darker colors. Since most dairy barns are painted light colors for sanitary reasons, it is doubtful whether color preference of flies is important in the selection of wall colors for dairy barns. Comparison of eight sprays for knock-down and kill when used in a dairy barn showed that seven of the sprays were not significantly different in knock-down efficiency, while one was inferior. The three nationally advertised commercial sprays tested were significantly less efficient in killing power than the five mixtures prepared here composed of various combinations of Thanite or pyrethrum concentrate. Superiority of some sprays in both knock-down and kill indicated the need for considering both factors in developing sprays for barns. Satisfactory results were obtained when the amount of spray used was at the ratio of 1 cc. to 38 cu. ft. of barn volume, which is one-half the amount used in the Peet-Grady laboratory test. Amounts simulating the ratio used in the Peet-Grady test caused the floors to become slippery. Some difficulty was experienced in dispersion of sprays made with oils of more than 50 sec. viscosity."

The larval stages of the celery fly Acidia heraclei L. and of the braconid Adelura apii (Curtis), with notes upon an associated parasitic yeast-like fungus, D. Keilin and P. Tate (*Parasitology, 35 (1943), No. 1–2, pp. 27–36, illus. 18*).

Development of the female reproductive system of Rhagoletis pomonella Walsh (Dipt.: Trypetidae), R. W. Dean. (N. Y. State Expt. Sta.). (*Ann. Ent. Soc. Amer., 35 (1942), No. 4, pp. 397–410, illus. 34*).—A further report of the author's study of the apple maggot (E. S. R., 74, p. 236).

The Mexican bean beetle in Florida, A. N. Tissot. (Fla. Expt. Sta.). (*Fla. Ent., 26 (1943), No. 1, pp. 1–8*).

Progress during 1942 of the program for the colonization of the milky disease of Japanese beetle larvae in Delaware—Second report, H. L. Chada, J. A. Ditman, and F. C. Daigh. (Del. Expt. Sta.). (*Peninsula Hort. Soc. [Del.] Trans., 56 (1942), pp. 86–92, illus. 1*).—This is the second progress report covering work on the colonization program for the establishment of the type "A" milky disease (*Bacillus popilliae* Dutky) of Japanese beetle larvae, or grubs, in Delaware (E. S. R., 87, p. 393).

The biology and behaviour of Ptinus tectus Boie. (Coleoptera: Ptinidae), a pest of stored products.—IV, Temperature preference, D. L. Gunn and B. M. Walshe (*Jour. Expt. Biol., 19 (1942), No. 2, pp. 133–140, illus. 2*).—In further work (E. S. R., 87, p. 549) it was found that in a long temperature gradient apparatus *P. tectus* aggregates around two distinct temperatures, 4° and 24° C. In a circular temperature alternative chamber there is no marked avoidance of low temperatures if the gradient is steep, but characteristic avoiding reactions occur if the gradient is not very steep. When the stationary animals are subjected to rising or falling temperatures in the long gradient, there is a well-marked evacuation temperature at 30°–33°, but none at lower temperatures. A temperature preference around 24° is correlated with favorable temperature for growth and other activities. The aggregation around 4° is the result of a failure of coordinated behavior in a particular kind of gradient, and *P. tectus* is practically immobilized by cold in that temperature region.

New genera and species af bark beetles of the subfamily Micracinae (Scolytidae: Coleoptera), M. W. Blackman (*U. S. Natl. Mus. Proc., 93 (1943), No. 3165, pp. 341–365, illus. 24*).

The white-pine weevil, H. J. MacAloney (*U. S. Dept. Agr. Cir. 221, rev. (1943), pp. 31, illus. 15*).—A revision (E. S. R., 67, p. 439).

The type species of the genera and subgenera of bees, G. A. Sandhouse (*U. S. Natl. Mus. Proc., 92 (1943), No. 3156, pp. 519–619*).

European spruce sawfly in 1942, R. E. Balch (*Nova Scotia Dept. Lands and Forests Rpt., 1942, pp. 90–93*).

Sampling technique for determining populations of the citrus red mite and its predators, C. F. Henderson and H. V. McBurnie (*U. S. Dept. Agr. Cir. 671 (1943), pp. 11, illus. 6*).—This technic was designed to overcome difficulties in that of Jones and Prendergast (E. S. R., 78, p. 673). A collecting apparatus which was developed is described. Efficiency tests of the apparatus and technic indicate an average recovery on the counting disks of 82 percent of the mite eggs occurring on citrus foliage and fruit.

Observations on the clover or brown mite, Bryobia praetiosa Koch, E. P. Venables (*Canad. Ent., 75 (1943), No. 3, pp. 41–42*).

Genera and species of parasitic mites (Acarina), C. D. Radford (*Parasitology, 35 (1943), No. 1–2, pp. 58–81*).—A list of the known and valid genera and species of parasitic mites, which includes the authority, year of validity, and original host.

ANIMAL PRODUCTION

Reactions of domestic fowls, [rabbits, pigs, cats, dogs, and sheep] to hot atmospheres (*Roy. Soc. Queensland, Proc., 53 (1941), pp. 105–128, illus. 7; 129–144, illus. 6; 145–158, illus. 6; 159–170, illus. 5; 171–188, illus. 7; 189–200, illus. 5*).—In the first of this series, by N. T. M. Yeates, D. H. K. Lee, and H. J. G. Hines, observations on four White Leghorn and four Australorp hens held for 7 hr. in insulated chambers under normal and different temperature conditions varying from 70° to 110° F. and various humidity conditions showed that the hens could not safely withstand a dry bulb temperature of 100° for 7 hr. unless the humidity was below 75 percent. As the temperature became higher, the tolerance time decreased rapidly. The protein level of the ration did not affect the heat tolerance. A good water supply, permitting the bird to dip its head, was helpful. Immersion of the whole bird in cold water was the best treatment for resuscitation.

In the second paper, by Lee, K. Robinson, and Hines, seasonal observations on rectal temperatures and respiration rate of two angora rabbits held for 7 hr. at temperatures from 70° to 110° showed the rabbits to be largely dependent on respiratory evaporation for regulation of the body temperature in hot environments.

In the third paper, by Robinson and Lee, observations on rectal temperatures and respiration rates of three male pigs for 7 hr. at different temperatures from 70° to 110° showed the rectal temperature to rise above normal when the dry bulb temperature was 85°–90°. The pig was unable to tolerate a relative humidity of 65 percent or above for 7 hr. when the dry bulb temperature reached 95°. This animal regulates its temperature by radiation and conduction from the exposed skin, but the principal method is evaporation from the moist mucous membrane of the mouth, snout, and upper respiratory tract. There was no evidence of acclimatization or permanent injury from repeated exposure to hot temperatures.

In the fourth paper, by Robinson and Lee, male cats exposed to different temperatures up to 7 hr. showed an increase in rectal temperature when the dry bulb temperature was above 90°. Regulation of heat was through evaporation of saliva from the coat and increased respiration.

In the fifth paper, by Robinson and Lee, with increases in temperature above 80°–85° the rectal temperature increased in two dogs. The pulse rate increased above 95° with a relative humidity of 75 percent. The respiratory rate increased over the whole range of temperature from 75° to 110°. The dog was unable to tolerate for 7 hr. an atmosphere of 105° with a relative humidity of 75 percent.

In the sixth paper, by Lee and Robinson, sheep showed the greatest tolerance to heat of any of the animals studied. Rectal temperatures of three merino ewes began to rise above normal at 90°, but 110° was withstood with a 65 percent humidity. Open-mouthed panting did not occur until the rectal temperature was 106°.

Grazing capacity as determined by range survey, C. B. Howe (*U. S. Dept. Agr., Bur. Agr. Econ., 1942, pp. 41+*).—A general description is given of the range survey method for estimating grazing capacity, with invitations for suggestions and criticisms from specialists.

La batata, cosecha de alto rendimiento alimenticio en Puerto Rico [The sweetpotato, a highly productive feed crop for Puerto Rico], E. L. Willet (*Agr. Expt. [Puerto Rico Univ. Sta.], 3 (1943), No. 1, pp. 3–6*).—A review of the nutritive value of sweetpotatoes, fresh and dried, as determined by several southern experiment stations.

Late-cut vs. early-cut soybean hay for stocker cattle, E. S. Good (*Kentucky Sta. Bul. 435 (1942), pp. 10*).—In a 107-day feeding trial, lots of 10 heavy steer calves each made average daily gains of 1.59 lb. on rations of corn silage and broken ear corn with soybean hay cut when the beans were three-fourths mature, as contrasted with average daily gains of 1.35 lb. made with a comparable lot of steers fed similar rations except that the soybeans were cut just after the bloom stage. The steers fed late-cut hay had sleeker coats and excelled in general condition toward the middle and last part of the experiment. A shote following the cattle on the late-cut hay gained 29 lb. more than another shote following the cattle receiving the early-cut soybean hay.

Silage and cottonseed meal for fattening yearling steers, J. H. Jones, R. E. Dickson, J. K. Riggs, and J. M. Jones (*Texas Sta. Bul. 622 (1942), pp. 22, illus. 5*).—Heavy yearling steers of about 700 lb. initial weight were reasonably well fattened in about 200 days on rations of cottonseed meal and sumac sorghum silage. The feeding of 5.5 lb. of cottonseed meal per head daily with the silage proved more profitable than either 4 or 7 lb. of cottonseed meal. The smaller amount did not produce adequate finish and the larger amount increased gains and finish, but the greater energy consumption was too expensive. Cottonseed oil in amounts up to 1 lb. per head daily and cottonseed up to 6.4 lb. per head daily did not have a laxative effect. Cottonseed oil had a high energy value but was too costly for practical use in this way. The amounts of cottonseed oil averaged 0.18, 0.58, and 0.98 lb. per head daily. Glossy coats were exhibited by steers receiving oil. In one experiment the protein and fat were nearly as efficiently supplied in cottonseed as in cottonseed meal and cottonseed oil. The studies were conducted during 3 yr., employing five lots of steers each with three amounts of cottonseed meal and the silage full fed.

The Wyoming system for scoring Corriedale sheep, F. S. Hultz (*Wyoming Sta. Bul. 258 (1943), pp. 46, illus. 7*).—Continuing the study of breeds of sheep and attempts to establish scoring systems (E. S. R., 74, p. 379), a scoring system was developed for Corriedales based on photographs, body measurements, and wool qualities of 47 ewes and 4 rams. There was found to be a close similarity between the diagrammatic scores and the actual photographs of the same sheep. The measurements employed were height at withers, height at loin, chest to ground, chest depth, flank to ground, chest width, rear quarter, body length, heart girth, and shin girth. The fleece score placed 80 percent of the emphasis on the clean wool produced, 10 percent on variability in diameter of fiber, and 10 percent on type of crimp.

Hog production for New Mexico, P. E. Neale, J. W. Benner, and J. H. Knox (*New Mexico Sta. Bul. 298 (1942), pp. 23, illus. 4*).—This gives general information on hog production in New Mexico, with suggested rations for swine of different ages. Descriptions of different diseases are included.

The detoxification of cottonseed meal for hogs, W. E. Sewell (*Alabama Sta. Bul. 259 (1943), pp. 28, illus. 10*).—Experiments with rats, chicks, and hogs showed the toxicity of cottonseed meal to be related to the content of free gossypol in the meal. Sufficient heat with moisture was found to remove the gossypol. Cottonseed meal and cottonseed meats containing little or no free gossypol were prepared by boiling commercial meal 30 min. in two and one-half times its weight of water. Meal so prepared compared favorably with peanut meal as a protein supplement to corn for hogs and chicks at a level of 25 percent of the ration. The study included chemical analyses of cottonseed meal from 16 mills. There was no apparent relationship between the protein content of the meal and its gossypol content, but the gain of rats in 9 weeks and day-old chicks in 6 weeks was inversely related to the gossypol content of the meals. In the study with hogs, 6 lots of 8 approximately 30-lb. pigs each were fed for 20 weeks on rations containing sufficient cottonseed meal or peanut meal to balance the corn. There were no deaths in the lots receiving peanut meal or heat-treated cottonseed meal and average daily gains of 1.19 and 1.26 lb., respectively, were made. Cottonseed meal boiled for 30 min. over an open fire in a steel barrel proved as effective for feeding as peanut meal. In several chemical tests the free gossypol content of the meal was found to vary with the moisture and heat treatments to which the meal was exposed during manufacture.

Suggestions for meeting the war-time poultry feed situation, L. A. Maynard et al. (*Natl. Res. Council, Com. Anim. Nutr. Rpt. 1 (1942), pp. 3+*).—Suggestions are made to meet the need in poultry rations for protein, vitamins A, D, riboflavin, and the water-soluble factors usually associated with riboflavin in poultry rations.

Corn and wheat as the main part of laying rations, G. F. Heuser. (Cornell Univ.). (*Poultry Sci., 22 (1943), No. 2, pp. 123–125, illus. 1*).—Three lots of 37 birds each received rations of mash containing 60 percent corn meal or 60 percent wheat feeds or a mixture of 20 percent corn meal, 20 percent wheat middlings, and 20 percent wheat bran, with scratch grains of cracked corn, wheat, and half of each of the feeds, respectively, for an entire year. The production on the corn ration was 42.4 percent, the wheat ration 51.1, and the combination 57 percent. There was practically no difference in mortality. The ration containing wheat resulted in a higher grain and total feed consumption, due to the preference for wheat over corn.

Soybean oil meal in the chick starting ration, J. S. Carver, M. Rhian, G. E. Bearse, D. Boucher, L. R. Berg, and V. L. Miller. (Wash. and West. Wash. Expt. Stas.). (*U. S. Egg and Poultry Mag., 49 (1943), No. 3, pp. 131–133, 141–144*).—The results of experiments conducted at Pullman and Puyallup, Wash., in the use for baby chicks of soybean meal in various proportions of the protein supplements (which included fish and meat meal) showed that large amounts of soybean meal proved satisfactory. Rations containing 20 percent protein, with soybean meal as the only protein supplement, produced as good gains as rations containing both herring fish meal and soybean meal as protein sources in a ration containing 17.5 percent protein. The studies were conducted in one experiment at the main station and three experiments at the Western Washington Station with approximately 14 lots of about 18 chicks each. The conclusions were in accord with those previously presented (E. S. R., 88, p. 236).

Utilization of fat by chickens—A method for determining the absorption of nutrients, D. Whitson, C. W. Carrick, R. E. Roberts, and S. M. Hauge. (Ind. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 2, pp. 137–141*).—In testing the effects of fat percentages in the ration on the utilization of feed, 3 lots of 120

Barred Plymouth Rock chicks each were fed rations containing, respectively, 0, 6, and 17.75 percent soybean oil. Barium sulfate was fed so that the composition of the feed might be related to the feces composition at 8, 10, and 12 weeks It was shown that with the low, medium, and high fat rations there was 82.77, 91.66, and 94.61 percent, respectively, of the fat consumed which was absorbed. More fat was excreted in the feces of chicks on the high fat diets than on the low fat ration, but the percentage of fat in the diet excreted decreased as the fat level increased. A variance analysis showed that there was a significantly lower fat utilization at 8 weeks than at 10 or 12 weeks of age.

Fattening cockerels by stilbestrol administration, F. W. Lorenz. (Univ. Calif.). (*Poultry Sci., 22 (1943), No. 2, pp. 190–191*).—Implantation of 20 3-week-old Single-Comb White Leghorn cockerels with stilboestrol pellets produced an increase of 43 gm. at 8 weeks of age over that of 21 untreated controls. Changes in body composition were also induced.

The use of cockerel and pullet chicks in the determination of the gross value of protein supplements, E. I. Robertson, M. Rhian, and A. L. Palafox. (Wash. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 2, pp. 99–101*).—The gross value of protein (E. S. R., 84, p. 381) could be determined with either cockerels, pullets, or unsexed chicks. No significant sex differences were found when nine protein supplements were employed in a study by variance analysis. The studies were conducted with 22 groups of cockerels and 24 groups of pullets kept on a basal ration containing 8 percent crude protein until 14 days of age. Sufficient quantities of proteins from casein, herring fish meal, pilchard fish meal, salmon fish meal, meat meal, soybean meal, dried skim milk, one-half each of herring fish meal and soybean meal, and one-half each of herring fish meal and pea meal to furnish 3 percent of the crude protein were added. Individual group weights and group feed consumption were ascertained after 1 and 2 weeks.

An unidentified nutritional factor required by the chick for feather pigmentation, J. McGinnis, L. C. Norris, and G. F. Heuser. (Cornell Univ.). (*Jour. Biol. Chem., 145 (1942), No. 1, pp. 341–342*).—Failure of Rhode Island Red chicks to develop normal pigmented feathers at 6 weeks was noted when they had received a ration of degerminated yellow corn meal, peanut meal, casein, soybean oil, and sources of vitamins and minerals. When the ration was supplemented with 5 percent dried yeast, no abnormalities in feather pigmentation or feather development were observed. Even with supplements of choline or biotin, feather development was poor and there was no pigmentation, but with the dried yeast supplement, feather development and pigmentation were excellent. Suggestion is made of the possibility of *p*-aminobenzoic acid or inositol being needed, and future work will be with them.

Observations on the shank pigmentation of chicks, V. Heiman and L. W. Tighe (*Poultry Sci., 22 (1943), No. 2, pp. 102–107, illus. 5*).—Extraction with acetone of the pigment from a uniform-sized piece of shank skin, and measurement with a photoelectric colorimeter, were found to give reproducible results with skin from the right and left shanks of 13 groups of 10 chicks each when fed different rations. Although there was considerable variation in shank color among the chicks on the same rations, increases in the pigment intake resulted in a pigment increase in the shanks. When the pigment was withdrawn from the ration, a steady loss of pigment from the shanks followed until they were practically colorless. There was no relation between body weight and shank pigmentation. The photoelectric colorimeter readings did not record visual color but rather the color extracted. The results were based on the shank color of several hundred chicks.

Note on a green pigment in the fat of a chicken, A. R. Kemmerer and G. S. Fraps. (Tex. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 2, p. 189*).—A green pigment of the body fat of a dressed hen showed a general absorption in the blue end of the spectrum and was thought to be an ester of biliverdin.

Relation between cut-up chicken proportions and prices, M. A. Jull, R. E. Phillips, and C. S. Williams. (Md. Expt. Sta.). (*U. S. Egg and Poultry Mag., 49 (1943), No. 3, pp. 122–124, 139–141*).—The actual and percentage weights are given for parts and offal of large and small carcasses of New Hampshire and Barred Plymouth Rock×New Hampshire crossbred fowls. Two different sets of prices were applied to the results, from which the costs of evisceration and dressing were calculated.

Stabilizing quality in shell eggs, E. M. Funk. (Univ. Mo.). (*U. S. Egg and Poultry Mag., 49 (1943), No. 3, pp. 112–114, illus. 4*).—The keeping quality of eggs was increased by immersing the eggs in special oil or in water at 130° to 142° F. The eggs were rendered infertile by rotating in oil for 10 min. at 140° F., and most shell bacteria causing spoilage were destroyed. Cooking tests showed thermostabilized eggs to retain their edible quality longer than untreated eggs in storage.

A study of artificial incubation of Runner duck eggs: Requirements, A. L. Romanoff. (Cornell Univ.). (*Poultry Sci., 22 (1943), No. 2, pp. 148–154, illus. 1*).—The conditions giving the most uniform hatch with low embryonic mortality, most efficient metabolism, production of heavy birds, and best early growth were a slow rate of air agitation, a relative humidity of 70 percent or higher up to hatching, with 60 percent or lower at hatching time, and an incubation temperature of 99.25° F., with a slight drop (about 0.5°) at hatching. The study was conducted on 2,630 uniform, fresh White Runner duck eggs incubated in 11 electric laboratory incubators. Constant temperatures from 98° to 105°, with varying relative humidities and air movement, were maintained in the different incubators. The normal peak of hatching was on the twenty-seventh day, extending not more than 2 days in either direction. The time of hatching was shifted about 3 days by 3° differences in incubation temperature. Differences of 40 percent in the relative humidity shifted the time of hatching 0.5 day. Movement of air, humidity, and temperature had important influences on the time and distribution of hatch. The highest embryonic mortality occurred in the first and last weeks of incubation.

The composition of turkeys of different varieties and strains, H. M. Harshaw, W. L. Kellogg, R. R. Rector, and S. J. Marsden. (U. S. D. A.). (*Poultry Sci., 22 (1943), No. 2, pp. 126–136, illus. 2*).—Analyses similar to those previously given (E. S. R., 84, p. 516) are reported for turkeys, showing that varieties and strains differed in the ages at which the best finish is attained. Physical and chemical analyses were made of the carcasses in 1940 and 1941 of five males and five females each of the standard-bred and broad-breasted Bronze, White Holland, and Beltsville Small White breeds. In 1940 all the birds were killed at 28 weeks of age, but in 1941 all except the Beltsville Small White were allowed to grow until 30 weeks of age. Illustrations of the carcasses of males and females show the broad-breasted Bronze to be a better meat type than the other breeds, with the Beltsville Small White ranking second in this respect. This result was based on average live weight, ratio of dressed weight to live weight, and ratio of drawn weight to live weight. The broad-breasted Bronze also excelled the other breeds in the ratio of breast muscle and leg muscle to dressed weight but contained less fatty tissue. In chemical composition differences in fat were more pronounced than the other elements. There were no consistent differences between the sexes in chemical composition of carcass, although females of all varieties were generally fatter than males.

DAIRY FARMING—DAIRYING

War emergency plans for raising calves and heifers, E. S. Savage, W. E. Krauss, and S. W. Mead (*Natl. Res. Council, Com. Anim. Nutr. Rpt. 5 (1942), pp. 11+*).—The nutritive requirements of the calf are presented, with suggestions on how they may be best complied with to get maximum growth, development, and milk production. Rations are suggested for calves and heifers of different ages.

The utilization of β-hydroxybutyric acid by the perfused lactating mammary gland, J. C. Shaw and W. E. Petersen. ([Conn.] Storrs Expt. Sta. and Univ. Minn.). (*Jour. Biol. Chem., 147 (1943), No. 3, pp. 639–643*).—The mammary gland from a cow exhibiting ketonemia needs much more β-hydroxybutyric acid than that of the normal cow. This additional utilization was sufficient to account for most of the oxygen consumed by the gland. As much as 88 percent of the oxygen consumption of the perfused gland (E. S. R., 85, p. 242) was due to the burning of β-hydroxybutyrate when the concentration of the latter substance was maintained at or above 28 mg. percent.

Absorption of odors by milk, G. M. Trout and D. Y. McMillan (*Michigan Sta. Tech. Bul. 181 (1943), pp. 26, illus. 4*).—Data showed rather conclusively that warm milk produced in a clean, well-ventilated stable and exposed to various surroundings does not readily take on the odor of those surroundings. However, milk exposed in silos filled with corn or grass silage did absorb an abnormal flavor. The absorption of odors in the normal production of milk is deemed much overemphasized. In the closed home refrigerator milk should be tightly capped to avoid intense odors from foods such as onions and cooked cabbage and turnips. The studies were conducted in three experiments with raw, pasteurized, homogenized, and heated milk exposed for 15–90 min. at 50° and 100° F. to feeds and disinfectant odors of the cow barn and to foods. Although milks varied somewhat in their absorptive capacities, raw and pasteurized milk were slightly more susceptible to foreign odors than homogenized and heated milk where creaming was inhibited. Absorption of odors was slightly greater in liquid fat than when the fat was in a solid state.

Centrifugal test to measure the thoroughness of homogenization, W. E. Snyder and H. H. Sommer. (Univ. Wis.). (*Milk Dealer, 32 (1943), No. 5, pp 36, 38, 42, 44, 46, illus. 3*).—The centrifugal separation test will detect variations of less than 250 lb. in the homogenizing pressure. The importance of the fat content of the milk made necessary the taking into account of the percentage of butterfat when appraising the efficiency of homogenization.

The use of a direct reading pH meter for routine examination of milk at the dairy plant intake, H. K. Johnston and F. J. Doan. (Pa. Expt. Sta.). (*Jour. Dairy Sci., 26 (1943), No. 3, pp. 271–276, illus. 3*).—A Beckman direct reading pH meter was employed in the milk plant without interfering with or slowing the dumping, weighing, or sampling of the milk. A remote electrode was connected with the instrument by shielded lead wires, and a temperature correction was established. Observations were made on 702 samples of herd milk collected during different seasons of the year.

The value of chlorine in producing low bacterial count milk, J. H. Byers and H. P. Ewalt. (Oreg. Expt. Sta.). (*Jour. Dairy Sci., 26 (1943), No. 3, pp. 277–281, illus. 1*).—The use of 150 p. p. m. of chlorine in the udder wash water and in the teat cup rinse water reduced the bacterial count of the milk 342 percent, the wash water 93.8, the teat rinse water 36.2, and the teat cup rinse water 42.7 percent. The beneficial results were found with 10 trials on each of seven cows with and without water to which the chlorine was added. There was a negative correlation between the chlorine content of the wash and rinse waters and the bacterial content of the milk.

The methylene blue test, E. G. Hood, C. A. Gibson, and I. Hlynka (*Canad. Dairy and Ice Cream Jour., 22 (1943), No. 2, pp. 30–32*).—The methylene blue test has value for indicating the sanitary conditions under which milk is produced, but it does not differentiate between relatively harmless or beneficial bacteria and those affecting flavor. It is not recommended for the selection or rejection of milk for cheese. Methylene blue tests were made on 32 samples of milk divided and held over night at 46° or 58° F. Cheese from the milk was graded at about 15-, 25-, and 50-day intervals thereafter.

The optimum temperature of growth of 22 cultures of Oospora lactis, N. S. Golding and D. D. Miller. (Wash. Expt. Sta.). (*Jour. Dairy Sci., 26 (1943), No. 3, pp. 251–257, illus. 1*).—The optimum temperatures of growth of 22 cultures of *O. lactis* isolated from commercial cream delivered during warm spells and grown by methods previously noted (E. S. R., 84, p. 240) were found to range from 77.5° to 86° F. Variations in temperature above the optimum were of more importance in inhibiting growth than variations below the optimum. The mycelium test was shown to increasingly lose its value between the optimum temperature of the growth of the molds in the cream and a temperature approximating 37° C.

A rapid method of churning cream into butter for mold mycelia determinations, H. H. Wilkowske and K. M. Renner (*Jour. Dairy Sci., 26 (1943), No. 3, pp. 283–287*).—A rapid method for churning a small sample of cream into butter with a malt mixer was developed. Such butter gave comparable mold mycelia counts to those of butter regularly churned from the same cream. The comparative tests were run on 66 samples of cream and the butter made from them.

Studies of storage butters showing surface deterioration, A. H. White (*Sci. Agr., 23 (1942), No. 1, pp. 41–58*).—A bacterial and chemical study of 38 samples of commercial butter which developed surface flavor defects and 7 which maintained grade during storage for from 1 to 16 mo. at from —20° to 15° F. indicated that either bacterial or chemical factors, or both, may be responsible for undesirable flavors. Contamination with copper and iron and growth of undesirable organisms at the surface must be kept at a minimum to have stored butter maintain optimum pH values of from 6.7 to 6.9. The general types of organisms from the surface and the interior of the samples were essentially the same. The counts of proteolytic, lipolytic, and oxidase-positive organisms were relatively high when the total counts exceeded 100,000 per cubic centimeter at the surface. Few or none of these types were present on plates from lower count samples. Of 36 samples with degraded flavor, 29 had higher total bacterial counts on the surface than from the interior. "There did not appear to be any close correlation between the relative number of organisms on the surface and in the interior of the butters and the type of defect after storage." In the chemical studies all samples with fishy flavor had low pH values and those maintaining grade had pH values generally above 7. There was little difference between the copper content of the butters which lost grade and those which maintained quality. Oxidative changes were greater at the surface than in the interior.

Methods of standardizing ice-cream mixes, W. C. Cole (*California Sta. Cir. 333, rev. (1943), pp. 48, illus. 2*).—A revision and amplification of the methods and recipes for ice cream mixes (E. S. R., 71, p. 95).

Wartime mixes with soy bean flour, wheat germ, and other substitutes, P. H. Tracy. (Univ. Ill.). (*Ice Cream Trade Jour., 39 (1943), No. 2, pp. 16–17, 51*).—Portions of the milk solids-not-fat of ice cream mixes were satisfactorily replaced with certain vegetable fats such as oat flour and soybean flour, with the production of a satisfactory product. The additional nutrients and legality of cereal substitutions for the milk solids should be considered.

VETERINARY MEDICINE

Manual of veterinary bacteriology, R. A. Kelser and H. W. Schoening (*Baltimore: Williams & Wilkins Co., 1943, 4. ed.,* [*rev.*], *pp. 719+, illus. 94*).—A revised edition of this work (E. S. R., 80, p. 538), of which H. W. Schoening is now coauthor. M. S. Shahan assisted in the preparation of the chapter on virus diseases; H. R. Seibold, the chapter on stains and staining methods; W. T. Miller, the chapter on streptococci and staphylococci; A. B. Crawford, the chapter on *Brucella;* and G. Dikmans, the chapter on protozoa.

Poisonous and injurious plants of Panama, P. H. Allen (*Amer. Jour. Trop. Med., 23 (1943), No. 1, Sup., pp. 1–76, illus. 20*).—This contribution, which brings together present information on the plant species of Panama having highly injurious properties, is presented with a list of 32 references to the literature.

Resistance of Staphylococcus aureus to the action of penicillin, C. H. Rammelkamp and T. Maxon (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 3, pp. 386–389*).—It has been found that strains of *S. aureus* vary only slightly in their susceptibility to the antibacterial action of penicillin. By growing the organism in increasing concentrations of penicillin over a long period it was possible to render the organism resistant to penicillin. Similar degrees of increased resistance were found in four strains of staphylococci isolated during the course of penicillin therapy for localized infections.

Propamidine—a new wound antiseptic (*New England Jour. Med., 228 (1943), No. 12, pp. 405–406*).—A review of the present knowledge of this new antibacerial agent (4 : 4′diamidino-diphenoxypropane dihydrochloride) for topical application in infected wounds, presented with a list of references to the literature.

A sulfonamide film for use as a surgical dressing.—Preliminary report, K. L. Pickrell (*Bul. Johns Hopkins Hosp., 71 (1942), No. 5, pp. 304–306*).

Sulphanilamide in animals: Dosage and tolerance, A. W. Stableforth and S. L. Hignett (*Vet. Rec., 54 (1942), No. 51, pp 525–532, illus. 9*).—A report is made of work in which a series of horses, cows, and dogs were given various doses of sulfanilamide, single or repeated, by the oral or subcutaneous routes, estimations of the concentration of the drug present in blood and milk being made at intervals during and after dosage and records kept of the clinical symptoms produced and of any serious toxic effects which followed. "The rate of dosage included single doses from 1 gm. per 20 lb. body weight to 1 gm. per 5 lb. weight and in some cases higher doses and schemes of continued dosage intended to give a steady concentration of about 10 mg. percent (mgm. per 100 cc.) in blood and milk, respectively." The findings have led to the conclusion that the necessary initial and maintenance doses are: "For dogs 1 gm. per 15 lb. body weight (approximately 1 gr. per pound), followed by maintenance doses of the same amount daily; for horses 1 gm. per 10 lb. body weight (approximately 180 gr. per hundredweight), followed by maintenance doses of 1 gm. per 20 lb. to 1 gm. per 10 lb. body weight daily; [and] for cows 1 gm. per 10 lb. body weight, followed by maintenance doses of 1 gm. per 10 lb. body weight daily. In horses and dogs the daily maintenance does is best divided into three doses given at intervals of 8 hr.—because the concentrations peak and drop quickly—in cows it is probably best given in two doses. A few observations made on other species suggest that sheep should be treated like cows and pigs like horses."

Effect of direct applications of tyrothricin and allantoin to cells in vitro, C. M. Pomerat (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 3, pp. 345–348, illus. 12*).—Despite its well-known hemolytic effect tyrothricin apparently does not inhibit materially either mitosis or migration of fibroblasts or the activities of leucocytes following its direct applications to tissue culture media.

Toxic effects of tyrothricin, gramicidin, and tyrocidine, C. H. Rammelkamp and L. Weinstein (*Jour. Infect. Diseases, 71 (1942), No. 2, pp. 166–173, illus. 1*).—It was shown that the intravenous administration of tyrothricin in mice and dogs results in death of the experimental animal. "Tyrothricin and tyrocidine cause hemolysis of erythrocytes, and both substances have been found to be leukocytolytic. Gramicidin is only slightly leukocytolytic. The injection of large amounts of tyrothricin or gramicidin into the closed cavities of the body is accompanied by both local and general toxic effects. It is possible, however, to inject amounts of the bactericidal substance small enough to sterilize local infections without producing general toxic effects and giving only minimal local reactions. The intradermal injection of tyrothricin produces marked induration. Gramicidin also produces a local reaction when injected into the skin, but it is less marked than that observed following the injection of tyrothricin. Oral administration of tyrothricin is not accompanied by toxic effects, but it is ineffective in reducing or destroying organisms which are susceptible in vitro. Local application of the bactericidal substance is not attended by toxic reactions even when large amounts are applied."

Observations on the route of migration of the common liver fluke Fasciola hepatica in the definitive host, W. H. Krull and R. S. Jackson. (U. S. D. A.). (*Jour. Wash. Acad. Sci., 33 (1943), No. 3, pp. 79–82*).—While the essentials of the life history of the common liver fluke have been known since 1882, in which year it was shown that the snail *Lymnaea truncatula* serves as an intermediate host of this important parasite, the details concerning the development of the fluke in the intermediate and definitive hosts have remained to be fully worked out. Important among these is the route of migration to the liver of the young fluke after its excystment in the digestive tract of the definitive host.

The experimental data here reported have shown that, "if juvenile flukes reach the peritoneal cavity of rabbits and sheep, they migrate to the liver, penetrate the capsule and parenchyma, enter the bile ducts, and mature. Furthermore, it is shown that entrance through the bile duct is precluded as necessary in the infection of rabbits and sheep. However, it is not eliminated as a possible infection route. In view of the experiments recorded in this paper, particularly those concerning the transfer of flukes to the thoracic cavity, and because of the large size of some of the flukes transferred, the circulatory system as a transfer route also is precluded as being necessary. However, a source of blood seems to be essential for survival. The juvenile flukes are able to secure blood because of their ability to penetrate tissues. Since 78 percent (56 flukes) of the 72 juvenile flukes used in the transfer experiments with rabbits were recovered in necropsies, there is reason to believe that infection via the peritoneal cavity is the principal, if not the sole, route of infection. The limited experiments involving the transfer of juvenile flukes to the thoracic cavity indicate that obscure symptoms of disease, or death, may be traced to liver flukes, even though the flukes themselves may not always be recoverable."

Microorganisms of group E of the genus Salmonella, D. W. Bruner and P. R. Edwards (*Kentucky Sta. Bul. 434 (1942), pp. 12*).—In the course of a study of 320 cultures of group E of the genus *Salmonella* the biochemical and serological properties of the bacilli were considered and their occurrence and distribution in the United States determined. The chief facts brought out by the study are the following: "The types recognized included *S. london*, *S. give*, *S. anatum*, *S. meleagridis*, *S. lexington*, *S. newington*, *S. new brunswick*, *S. illinois*, *S. senftenberg*, and *S. simsbury*. Four new *Salmonella* types were recognized and described. *S. meleagridis*, the antigenic formula of which is III,X,XXVI: e,h—l,w, was isolated from turkeys, chickens, hogs, and man. *S. lexington* was isolated from the mesenteric lymph glands of apparently normal hogs and is represented by the formula III,X,XXVI: z_{10}—1,5... . *S. illinois* was found in hogs, partridges, and turkeys. To it was assigned the antigenic formula of (III),(XV),XXXIV: z_{10}—1,5... . *S. simsbury* was derived from a human carrier and was represented by the formula of I,III,XIX: z_{27}. The organisms were isolated from turkeys, chickens, Hungarian partridges, ducks, hogs, sheep, rats, man, and water."

Two new Salmonella types with similar somatic antigens, W. B. Cherry, P. R. Edwards, and D. W. Bruner. (Ky. Expt. Sta.). (*Soc. Expt. Biol. and Med. Proc., 52 (1943), No. 2, pp. 125–126*).—Two new *Salmonella* types having similar somatic antigens are described as *S. florida*, isolated from the excreta of a patient, and *S. madelia*, isolated from the liver of a poult that died of septicemia.

Natural transmission of immunity against Trichinella spiralis from mother rats to their offspring, J. T. Culbertson (*Jour. Parasitol., 29 (1943), No. 2, pp. 114–116*)."The immunity acquired by rats after infection with *T. spiralis* is transmitted to their young, the transfer occurring largely, if not entirely, through the milk of the immune mother. The young born of normal mother rats promptly become immune if permitted to nurse an immune mother rat. Conversely, the young of an immune mother are as susceptible as the young of a normal mother if they are transferred at birth to a normal mother."

Number of larvae and time required to produce active immunity in rats against Trichinella spiralis, J. H. Fischthal (*Jour. Parasitol., 29 (1943), No. 2, pp. 123–126*).—The low numbers of adult *T. spiralis* recovered from the intestines and the low numbers of larvae recovered from the muscles of rats have indicated that a single small dose of larvae is capable of producing immunity, and that a period of approximately 14 days is adequate to develop this immunity. "The feeding of 80 larvae produces a fairly high degree of immunity in 14 days; the 160 dose produces in the same length of time a higher degree of immunity, while both the 320 and 640 doses of larvae apparently produce complete immunity in a period of 14 days. The immunity produced is effective against the intestinal phase of the parasite. Little or no immunity is produced within 7 days after feeding 80 to 640 larvae."

Comparison of pH and population of Trichomonas foetus, B. B. Morgan. (Wis. Expt. Sta.). (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 3, pp. 380–382, illus. 5*).—This contribution relates to the correlation between H-ion concentration and population of several pure culture strains and two strains of *T. foetus* in association with an atypical strain of *Corynebacterium renalis*.

Cultivation of a bacteria-free strain of Trichomonas fetus, W. N. Plastridge. ([Conn.] Storrs Expt. Sta.). (*Jour. Bact., 45 (1943), No. 2, pp. 196–197*).

Susceptibility of hamsters to peripheral inoculation of western, eastern, and West Nile encephalitis viruses, D. W. Watson and J. E. Smadel (*Soc. Expt. Biol. and Med. Proc., 52 (1943), No. 2, pp. 101–104*).—It is shown that the Syrian hamster readily becomes infected when small amounts of the viruses of eastern, western, or West Nile encephalitis are inoculated by peripheral routes. The viruses appear in the circulating blood of the infected animals, and the diseases usually terminate fatally. It is thought that this animal should prove useful in experiments dealing with insect transmission of these three viruses and with the resistance of treated animals to infection.

Close relation between Russian spring-summer encephalitis and louping-ill viruses, J. CASALS and L. T. WEBSTER (*Science, 97 (1943), No. 2515, pp. 246–248*).—Report is made of the finding of a strain of spring-summer encephalitis virus from Russia to be similar to a strain of louping ill virus, responsible for the tick-borne encephalitis of sheep in Scotland and possibly of Australian X disease of children.

Titration and neutralization of the western strain of equine encephalomyelitis virus in tissue culture, C. H. HUANG (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 3, pp. 396–398*).—Titration of potency of the western strain of equine encephalomyelitis virus and quantitative estimation of neutralizing antibodies in hyperimmune horse serum have been demonstrated by use of tissue cultures. The in vitro method of detecting the presence of virus appeared to be more sensitive than intracerebral mouse inoculation.

Identity of viruses from cases of equine encephalomyelitis during 1942, M. S. SHAHAN and L. T. GILTNER. (U. S. D. A.). (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 793, pp. 271–275*).—Immunological studies of seven strains of equine encephalomyelitis virus isolated in 1942 are reported. "Four strains of eastern virus were isolated from cases occurring in areas where only that type of virus had been isolated before. One strain of western virus was isolated from a case in an area where only that type of infection had been previously identified. A western virus was isolated from an Arizona case, bringing the total number of States in which this type of virus had been identified to 18. An eastern virus was isolated from a Michigan specimen, adding that State to the 12, previously recorded, where the eastern type of infection has been identified, and making a total of 3 States [Alabama, Texas, and Michigan] where both types have been found." The significance of identification of equine encephalomyelitis viruses and the need for further studies along that line are discussed.

Relationship of the St. Louis and the western equine encephalitic viruses to fowl and mammals in California, B. F. HOWITT and W. VAN HERICK (*Jour. Infect. Diseases, 71 (1942), No. 2, pp. 179–191, illus. 2*).—In continuing the earlier studies (E. S. R., 86, p. 683), antibodies against the St. Louis encephalitic virus have been found in the serums of normal fowl, horses, and other mammals, either alone or in combination with those of the western equine strain. A higher percentage of positive neutralization tests for both of these viruses has been obtained among serums of apparently normal domestic fowl and mammals in endemic areas of California than in supposedly nonendemic regions, although positive serums may be found among animals in the latter districts, mainly from the horses. It has also been shown that, while the percentage of positive results was higher among domestic animals, a small number of wild rodents may harbor antibodies to the western equine and the St. Louis strains. Although neither the western equine nor St. Louis virus has been recovered as yet from any of the rodent tissues, the virus of lymphocytic choriomeningitis has been obtained from the brain and organs of two wild house mice (*Mus musculus*).

Amblyomma americanum a vector of Rocky Mountain spotted fever (*Pub. Health Rpts. [U. S.], 58 (1943), No. 12, p. 491*).—Reference is made to the report by R. R. Parker and associates of the recovery of the rickettsia of Rocky Mountain spotted fever from nymphs of the lone star tick, 114 of which were collected at Weathers, Okla., from vegetation in close proximity to the home of a patient convalescing from spotted fever. Although suspected for the past decade of being a vector of this disease, this is the first discovery of rickettsia-infected individuals of this tick in nature.

The lethal dose of lead for the cow: The elimination of ingested lead through the milk, W. B. White, P. A. Clifford, and H. O. Calvery (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 793, pp. 292–293*).—Eighteen of 20 cows ingesting, on a single day, silage contaminated with red oxide of lead sufficient to furnish approximately 4.8 mg. of lead per kilogram of body weight failed to survive. Both of the survivors continued to give milk, and that of the one which had the full dose of lead contained sufficient lead to render the milk unsuitable for human consumption. In 4 mo. the lead content of the milk of the survivors did not differ from that of cows on a normal diet with no history of lead ingestion.

The value of the cell content and electrical conductivity of milk as criteria of bovine mastitis, J. F. Malcolm, C. W. King, and M. M. Campbell (*Soc. Agr. Bact. Proc. (Abs.), 13 (1942), pp. 30–34*).

"Sulvetil"—a new treatment for mastitis, C. C. Palmer (Univ. Del.). (*Holstein-Friesian World, 40 (1943), No. 7, pp. 441, 480*).—Reference is made to research work conducted in which the cure of a very large majority of field cases of mastitis was found to result from the injection directly into the udder by way of the teat duct of Sulvetil, a special homogenized preparation containing sulfanilamide, which supplements that of Kakavas (E. S. R., 88, p. 244). It may be used on heifers not yet in milk, dry cows, and milking animals (in which it should be given directly after milking).

Treatment of mastitis with tyrothricin, F. E. Martin (*Vet. Med., 38 (1943), No. 5, pp. 174–177, illus. 1*).—Report is made of the eradication of streptococcic mastitis from a herd of 49 Guernsey cows through the use of tyrothricin in conjunction with repeated microscopic examinations of milk samples from the entire herd. The treatment consisted of instilling an emulsion of tyrothricin in mineral oil into the infected quarters and repeating as indicated by the results of reexaminations. Of the 11 cows treated, 9 were cured; of the 26 quarters, 20 were cured. Two cases were dismissed as incurable. The number of treatments required varied from 1 to 9 (average 2.6) in doses ranging from 20 to 50 cc.

Supplemental report on the treatment of streptococcic mastitis with tyrothricin, F. E. Martin (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 793, pp. 267–268*).—Reporting further (E. S. R., 88, p. 102), 18 cows in a herd of 28 were found to be shedding long chain streptococci from 37 quarters. Diagnosis was made by the incubated film technic using individual quarter samples exclusively. Treatment consisted of instilling emulsion of tyrothricin into the infected quarters and repeating as indicated. Of 37 infected quarters 24 were cured and have remained negative for periods ranging from 2 to 8 mo. The diagnosis by incubated films made from composite samples was often found to be misleading.

Prevention and treatment of infectious calf scours with "sulfasuxidine" succinylsulfathiazole, H. W. Herriott (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 793, pp. 261–263*).—Report is made of the results obtained from the use of sulfasuxidine succinylsulfathiazole in several herds in which serious losses from calf scours had occurred. In general calves thus treated responded promptly, the symptoms subsiding without the set-back that results in the animals when treated with other common remedies. The findings indicate that this drug is an effective agent in the prevention and treatment of infectious calf scours, although definite conclusions must await the results of complete and extensive toxicological and bacteriological studies.

Osteodystrophic diseases of sheep in New Zealand.—I, Rickets in hoggets [yearling sheep], with a note on the aetiology and definition of the disease, L. W. N. Fitch (*Austral. Vet. Jour., 19 (1943), No. 1, pp. 2–16, illus. 7*).

Equine abortion, W. W. Dimock (*Jour. Amer. Vet. Med Assoc., 102 (1943), No. 793, pp. 282–284*).—A discussion of both virus (E. S. R., 87, p. 857) and *Salmonella* abortions of the equine, in which the technic of diagnosis is given particular attention.

Chemotherapy of canine piroplasmosis due to Babesia gibsoni, H. R Kapur (*Indian Vet. Jour., 19 (1943), No. 4, pp. 199–205*).—In comparisons made of Novarsenobillon, Sulfarsenol, and Tryparsamide during an outbreak of tick fever due to *B. gibsoni*, Novarsenobillon was the most effective, 10 out of 11 cases treated having completely recovered. Four injections of 0.01 gm. per pound body weight were given.

Preliminary observations on the efficacy of a product from oil of rose geranium for the removal of intestinal parasites from dogs, W. R. and H. A. Jones. (U. S. D. A.). (*Jour. Parasitol., 29 (1943), No. 2, pp. 151–152*).—It was found in the work reported that in doses varying from 1 to 25 cc. per dog a substance consisting largely of citronellol removed 100 percent of 46 ascarids from 10 dogs, 97 percent of 400 hookworms from 12 dogs, and 40 percent of 708 whipworms from 7 dogs.

Studies on fowl leukosis: Transfer to the chick embryo, M. Pierce (*Amer. Jour. Pathol., 18 (1942), No. 6, pp. 1127–1139, illus. 7*).—Report is made of experiments in which leucosis was produced in embryos, as well as in young fowls, by inoculation of the chorioallantoic membrane with unfiltered suspensions of leucotic spleen cells, leucocytes, and plasma. Leucosis did not develop in embryos inoculated with Berkefeld filtrates of these tissues, although they were infective for young chicks. Suspensions of the membranes inoculated with the filtrates and incubated for variable lengths of time failed to produce leucosis in fowls by intravenous inoculation.

The relative incidence of blood parasites in some birds from Georgia, P. E. Thompson (*Jour. Parasitol., 29 (1943), No. 2, pp. 153–155*).

Fibrosis of the pancreas in meat-fed ducks, I. A. Mirsky, S. Elgart, N. Nelson, and P. Wasserman (*Amer. Jour. Pathol., 18 (1942), No. 6, pp. 1159–1163, illus. 4*).—The authors have found that ducks maintained on a diet of meat and cod-liver oil develop pancreatic fibrosis that apparently is progressive. The first changes were observed in about 8 mo.

Detection of botulinus toxin in the blood stream of wild ducks, E. R. Quortrup and R. L. Sudheimer (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 793, pp. 264–266, illus. 1*).—Botulinus toxin was demonstrated in duck serums from naturally affected birds as well as from birds fed varying amounts of toxin. The toxin was neutralized by type C antitoxin. This test offers a positive means of diagnosis, as well as of typing without culturing. The toxin was detected in the blood stream as late as 68 hr., but not as late as 80 hr. following ingestion. "This finding apparently makes it possible to determine (within 3 days) when toxin was ingested, which should be of high importance for field workers investigating the ecology of western duck sickness. By closely observing the death rate of inoculated mice, it may be possible to determine the time of ingestion more accurately. The amount of toxin ingested must of course be taken into consideration, and this factor obviously cannot be determined in the field."

Daubentonia punicea (Cav.) DC. poisoning in pigeons, M. W. Emmel (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 793, pp. 294–295*).—The seeds of *D. punicea* (*longifolia*), previously determined by Thomas and Shealy (E. S. R., 59, p. 581) to be toxic for chickens, have been shown by the author to be a source of loss of carrier pigeons. The symptoms include pale green fluid vomitus, scant, green, watery droppings, and general weakness. There was a loss of tone in the musculature of the heart and gizzard, brilliant green staining of the lining of the gizzard, and duodenitis. In chronic cases these lesions were more intense, the spleen was enlarged to approximately three times its normal size and was dark in color, the kidneys were enlarged slightly, and the liver was pale or greenish in color. In acute cases of poisoning microscopic lesions were most pronounced in the intestines, liver, and kidneys. In feeding experiments from 6 to 18 seeds were required to kill a pigeon.

AGRICULTURAL ENGINEERING

Wartime responsibilities of agricultural engineers, L. J. Fletcher (*Agr. Engin., 24 (1943), No. 2, pp. 37–38*).—During the current emergency the author considers it necessary (1) to eliminate experimental perfecting of details of practices and devices; (2) to make use of every qualified and available man; (3) to recognize and utilize the ingenuity and resourcefulness of the individual farmer, dealer, serviceman, and of others, with respect, especially, to cooperative work and joint use of available equipment; (4) to help to maintain local repair facilities, keeping in mind the viewpoint that the millions of tons of farm products needed can only be secured by the increased production of a comparatively few bushels or pounds on each farm; and (5) to discover and pass on the most effective farm practices wherever found.

Soil conservation in the war period, H H. Bennett. (U. S. D. A.). (*Agr Engin., 24 (1943), No. 2, pp. 39–42, 50, illus. 4*).—The point especially emphasized is the fact that soil conservation measures, properly carried out, not only do not conflict with the program of greatly increased immediate production but definitely aid toward that end in that, generally, conservation farming means increased yields per acre immediately and, moreover, protection of the soil and maintenance of its productivity for next year's needs and for the needs of the future. It means also increased production per farm, generally, and increased total production. The inadequacy of the present numbers of trained personnel is also stressed, this situation being such that "an immediate and pressing assignment falls to the educators . . . to search out the most able of our young people and to prepare them as rapidly as possible for the many specialized demands in agricultural engineering . . . involving pretty nearly everything which in some way means manipulation of the soil in order to accomplish an agricultural use. Biology, physics, chemistry, biochemistry, hydrology, aerodynamics, agronomy, all make their contribution." A variety of examples of current practices and new devices in soil conservation work included snow survey, conservation of water supplies by means of stock water ponds, the use of stratified flow (E. S. R., 88, p. 532) in a reservoir for the release of inflowing muddy suspensions which otherwise would eventually deposit their load on the lake's bed, dune stabilization, etc.

Developments in methods of testing and specifying coarse aggregates, L. H. Tuthill (*Jour. Amer. Concrete Inst., 14 (1942), No. 1, pp. 21–32, illus. 3*).—Emphasis and restriction are placed on that portion of the under-size material which is most detrimental to the production of uniform, high-quality concrete. Clean separation on a production basis is impracticable. Some material slightly smaller or slightly larger than the designated nominal size range of a coarse aggregate size fraction can be allowed without perceptible ill effect on the concrete. Characteristics of the under size and common practice in the screening and handling of aggregates are discussed. A test for determination of the "significant" (objectionable) portion only of the nominal under size is submitted and a specification based on this test. The proposed size limits of acceptable marginal material are ⅝ of the nominal minimum dimension for under size and ⅞ of the nominal maximum dimension for oversize, both to the nearest standard United States sieve number or to the nearest 1/16, ⅛, or ¼ in. on dimension screens according to size. When special screens are made up for these tests, the openings should be made as close to ⅝ and ⅞ of the nominal size as is practicable.

Effect of grinding in the large mixers on aggregate grading at Hiwassee Dam, W. R. Waugh (*Jour. Amer. Concrete Inst., 14 (1942), No. 1, pp. 9–20, illus. 4*).—The author finds that grinding takes place to some degree in all mixers, and that comparison of properties of concrete affected by grading should, therefore, be made on the basis of grading of the aggregate in the mixed concrete rather than the grading of the aggregate before mixing takes place. In preparing grading specifications for aggregates, particularly sand, consideration should be given, if possible, to the effect of changes in grading due to grinding in the mixer. When investigating qualities and properties of aggregates, the aggregate having the most uniform grinding characteristic and the one showing least amount of grinding should be given preference, other factors being equal.

The properties of lightweight structural concrete made with Waylite aggregate, G. W. Washa and K. F. Wendt. (Univ. Wis.). (*Jour. Amer. Concrete Inst., 13 (1942), No. 6, pp. 505–517, illus. 2*).—The aggregate named is a steam-centrifuged, inflated, blast-furnace slag, cellular in structure, the fine material (from No. 4 to dust) weighing from 55 to 65 lb. per cubic foot on a loose, dry basis, coarse material (No. 4 to ⅜ in.), from 35 to 40 lb. per cubic foot. Scalping the fine Waylite (removal of all material coarser than a No. 8 screen) markedly improved the workability and helped to reduce bleeding. Addition of pulverized Waylite to regular or scalped fine aggregate did not improve workability enough to warrant its use economically. By far the best results were obtained by an addition of a fine sand equal to one-third the total weight of the Waylite aggregate for the fluid mixes and one-fifth the total weight for the vibrated mixes.

Fluid workable concrete free from bleeding was obtained. Strength, absorption, specific weight, toughness, stiffness, and durability characteristics of structural Waylite concrete are reported upon. Damage due to freezing and thawing was well predicted from the change in the dynamic modulus of elasticity. Reinforced concrete beams made with this aggregate closely followed the behavior observed for sand-and-gravel concrete beams.

Welding of 2-inch square reinforcing bars for piers of Pit River Bridge, R. Sailer (*Jour. Amer. Concrete Inst., 14 (1942), No. 1, pp. 53–58, illus. 4*).—Laboratory tests, prior to construction, showed that satisfactory welds could be obtained if low-carbon steel was used and if certain precautions were taken in the welding operations. The specifications for the steel and the necessary precautions are discussed. Tests of welds during construction confirmed the results of the laboratory tests.

High-strength wire for precast concrete beams. (Coop. U. S. D. A.). (*Colorado Sta. Rpt. 1942, p. 48*).—It was found possible to make satisfactory beams of small cross section (as 2 by 6 in.) with wire instead of the regular reinforcing bars. Beams of bending strength equal to beams of ordinary reinforcing could be obtained with half the volume of steel. Floors in adobe buildings, for example, may be supported on such beams, making them entirely fireproof.

The design of box culverts, C. R. Burky (*Jour. Amer. Concrete Inst., 14 (1942), No. 1, pp. 33–52, illus. 4*).—Some of the methods used in the design of box culverts are discussed. The author believes that much of the procedure outlined would apply to any concrete box structure. Inlet and outlet design is taken up, and transverse and longitudinal moments and sidesway are analyzed and formulated. Tentative dimensions for drainage culverts, side load, fixed beam, and symmetrical load figures, and longitudinal moments from foundation reactions are among the tabulated data.

Five ways to save labor and power in producing corn, C. K. Shedd. (Iowa Expt. Sta. and U. S. D. A.). (*Agr. Engin., 24 (1943), No. 2, p. 52, illus. 3*).—The following suggestions are briefly discussed: (1) Overhaul all machines before the working season to eliminate loss of time due to machine failures after field work is started; (2) use combinations of two machines in tandem where practicable for preparing the seedbed; (3) eliminate some customary but unnecessary operations in preparing the seedbed; (4) cultivate only as deep and as often as necessary to control weeds; and (5) for harvesting corn with mechanical picker, use large wagons and make wagon hitches and elevator arrangements as convenient as possible. With respect to operations in preparation of the seedbed, it is pointed out that when corn has been harvested by machine it is not necessary to cut or disk the stalks before plowing, as the plow does as well or better in handling the trash without any preliminary operation. An experiment carried on for 5 yr. showed that a single tillage with the tandem-disk harrow and spike-tooth harrow combination just before planting was usually sufficient preparation for either fall-plowed or spring-plowed fields.

Effects of planter attachments and seed treatment on stands of cotton, H. P. Smith and M. H Byrom (*Texas Sta. Bul. 621 (1942), pp. 16, illus. 7*).—On Lufkin fine sandy loam, a soil which tends to pack and crust after rains, better stands of cotton were obtained when the furrow for the seed was opened with a knife or runner-type furrow opener than when opened with either a narrow or wide shovel opener. The average percentage of emergence for the three types of furrow openers was 72.5, 59.3, and 55.5 percent, respectively. It appeared that the knife opener gave better results because it left a clean furrow and a firm seedbed with little loose soil. It did not disturb the soil enough to cause it to dry out as rapidly as when the furrows are made by shovel openers. A narrow shovel 1⅜ in. wide, with shields to hold the loose soil out of the furrow until the seed reached the bottom of the furrow, gave better results than a shovel 4 in. in width. The regular open center press wheel used after covering the seed and in combination with a knife opener gave a slightly higher percentage of emergence than did other types of press wheels. Rolling on the seed and pressing them in the bottom of the furrow before covering did not give any better stands than when the soil was pressed with an open center press wheel after covering. All types of press wheels gave slightly better stands of cotton on the Lufkin fine sandy loam than those obtained when no press wheel was used. Cottonseed planted at a constant depth gave better stands and yields on the Lufkin fine sandy loam than did cottonseed planted at variable depths.

Treatment of cottonseed with Ceresan was followed by significant increases in the emergence of cotton seedlings. Lime reduced emergence to some extent, while sulfur apparently had no effect on germination and emergence.

Machinery problems in peanut production, W. E. Meek (*Agr. Engin., 24 (1943), No. 2, pp. 48–50, illus. 6*).—Operations previous to harvesting can be carried out satisfactorily with the corn and cotton equipment already available. Digging, shaking, and stacking or bunching present problems and difficulties, however. Available equipment is satisfactory in the Southwest, where the fields are clean and the rows wide apart. It is possible to dig with a variety of sweeps attached to middle-breaker beams or to the cultivator feet. The shaking can be done very well with the side-delivery rake, and the bunching is done from the formed windrows with a fork by hand. These bunches are about the size of a bushel basket. Because of the lightness of the crop to be handled, the machinery named is very satisfactory, but in the Southeast "we find the farmers using everything from a half sweep on a single stock, . . . the various plows with the moldboard removed and with a wide or peanut share, up to the walking, riding, and tractor cultivators with a variety of blades, sweeps, and contraptions of wonderful design." Recently, however, a more efficient tractor cultivator attachment for digging peanuts has been made available. This consists of a blade running at an angle to the row and under the nuts. It is attached to the cultivator gangs and is a modification of the bean harvester. This attachment is simple, durable, and low in upkeep and first cost. It does not clog as badly as most diggers. The foreign vegetation in the peanuts makes clogging a very serious problem in the Southeast. Shaking (lifting the vines and shaking the dirt from the nuts, after which they are piled, usually on poles, for curing) has been and is being done by hand.

Digger-shaker combinations of several varieties have been made and sold, but most of them have several disadvantages, such as high initial cost, high upkeep, clogging, power required, and the fact that they are one-row, two-man machines. They usually do well in the territory where they are designed. When moved to other territories the results are not always satisfactory. Several modifications of details are mentioned, with the difficulties encountered in their use. The practice of plowing out the entire root is condemned on the ground of the soil depletion which results. The greater part of the root, with its nodules, should be cut off and left in the soil. Picking or threshing, which at present is done by simply feeding the vines with the nuts attached into the picker or thresher, might better be done by a combine attachment, but this development will have to wait for more complete data on field curing.

Fiber-flax machinery and processing operations in Oregon, W. M. Hurst. (Coop. Oreg. Expt. Sta.). (*U. S. Dept. Agr. Cir. 667 (1943), pp. 27, illus. 20*).—The operations involved in line fiber and tow production from the pulling of the flax in the field to fiber ready for spinning are outlined. Growth of flax mill facilities, mainly in Oregon, from 1936 through 1941 is briefly summarized, it being noted that in spite of the increased production in the preceding 4 or 5 yr., the fiber flax produced in the United States in 1941 was only about one-tenth of that needed to meet normal peacetime demands. The war has restricted trade channels, thereby creating a demand for home-grown flax for fire hose and other essential linen articles for our armed forces.

Machines for harvesting and processing, including pullers, deseeders, and scutchers, have been imported. There have been no local dealers selling or servicing flax machinery. Imports of machinery from Europe have been cut off due to the war and local firms are now in production. Several pieces of equipment developed by the Bureau of Agricultural Chemistry and Engineering are now being produced by local shops. The Bureau has developed an experimental deseeder which combs both the seed ends and root ends of the straw and a deseeder which combs only the seed ends of the flax straw; a bundle elevator developed because of the increase in the capacity of deseeders; a butter for evening the root ends of flax straw; improvements in hackling and scutching machinery; and a tow shaker improved with respect to efficiency of removal of shives.

Wartime farm building construction, C. L. Hamilton. (U. S. D. A.). (*Agr. Engin., 24 (1943), No. 2, pp. 43–45, illus. 1*).—This article is concerned mainly with a brief analysis and interpretation of War Production Board construction order L–41, softwood lumber order M–208, plumbing and heating order L–79, and other related orders.

Efficient farm buildings a wartime need, H. Curtis (*Agr. Engin., 24 (1943), No. 2, pp. 46–47, 50, illus. 1*).—This is a general discussion (1) of the problem of present structure requirements in relation to materials available for building them, and (2) the nature and extent of the demand for engineering goods and services to be expected at the end of the war.

Blackout of poultry houses and dairy barns, M. A. R. Kelley (*U. S. Dept. Agr. Leaflet 231 (1943), pp. 7, illus. 6*).—With reference to poultry houses it is noted that changes in the use of the lights should be made gradually, as sudden changes are likely seriously to reduce egg production. Turning off the lights entirely for one or more nights may result in pullets going into a molt. Early-morning lights give excellent results and appear to be better adapted for war conditions than any of the other methods of lighting. In defense areas the use of all-night lighting for laying hens should be discontinued.

In blacking out a livestock structure, livestock must have adequate ventilation for maintenance of health and production, and the moisture given off by the livestock must be removed in order to prevent excessive dampness in the structure and warping and buckling of black-out materials. The devices discussed and shown in plan or section drawings included a light-locked entrance for milkhouse or barn; light locks on ventilating fans; hinged black-out screen which may be closed from the outside and removable ventilating shutter for poultry houses; removable slatted and ventilating screens; arrangements for blacking out windows in dairy barns, including equipment for tilt-in windows and for double-hung sash, and a removable ventilating light lock; and light locks for various poultry-house ventilators.

Wartime iron wire poultry brooders, J. B. Dobie (*Washington Sta. Pop. Bul. 169 (1943), pp. 15, illus. 7*).—The wooden structure of the hover described is of the usual form, the dimensions suggested being 4 by 4 ft., the box part 8 in. deep, with 2- by 2-in. legs. The novel feature consists of a low-intensity heating element of 125 ft. of iron wire of about No. 21 B. and S. gage (No. 22 Washburn and Moen gage). The wire was wound on a 5/16-in. rod, stretched to a length of 47 ft., and tacked directly to the under side of the plywood top with double-pointed, insulated staples. The space between the coils was 4 in., and the outside loop was 2 in. from the sides of the hover. The wire was fastened in series through the thermostat. The attraction light, located in the center under the brooder, was on continuously This element consumes 650 w. at 110 v. and produces a low-intensity heat. When tacked directly to plywood or board it does not get warm enough to discolor the wood, and it is safer than the high-intensity, exposed heating coils. The iron wire brooder gave a very even heat distribution with a maximum of 7° F. differential (69°–76°) under the hover. Because of the use of the principle of radiant heat no curtain is necessary; in fact, it is detrimental in the operation of the brooder. By omitting the curtain on the hover, ventilation is improved and the drawing quality of the attraction light is enhanced.

Homemade electric lamp brooder, D. C. Kennard and V. D. Chamberlin (*Ohio Sta. Spec. Cir. 63, rev. (1943), pp. 4, illus 2*).—This circular has been slightly revised in the light of a further year of successful operation of the device described (E. S. R., 86, p. 843).

AGRICULTURAL ECONOMICS

Planning the farm business in south central Kansas, R. J. Doll (*Kansas Sta. Bul. 312 (1943), pp. 32, illus. 1*).—Utilizing as a basis, records kept in this area by farmers since 1930 and earlier, budgets are suggested and discussed for some of the combinations of enterprises which have proved most successful on farms of 160, 320, and 480 acres.

In each plan there is one major crop enterprise and at least one major livestock enterprise. Usually only two major enterprises and several minor enterprises are recommended. In no case is more than one-half of the crop acreage planted to wheat, and in most cases the wheat acreage is considerably less than one-half. A third characteristic is the recommendation of a considerable acreage of sweetclover for temporary pasture. Quality of products produced has been emphasized in all the organizations.

Labor needs for seasonal operations on New Mexico farms, P. W. Cockerill (*New Mexico Sta. Bul. 299* (*1943*), *pp. 14*).—"The agriculture of New Mexico is characterized by the fact that in addition to the normal steady demand for farm labor throughout the year there is a demand for seasonal labor which cannot be supplied to the usual extent in 1943 by local labor. Farm-enterprise labor which is outstanding in this respect includes chopping, hoeing, and picking of cotton; harvesting of beans, broomcorn, vegetables, and fruit; herding and lambing on sheep ranches; and seasonal labor on cattle ranches. . . . This bulletin indicates the extent of the need for labor for the more pressing of these operations, the time that the labor will be needed, and factors affecting the labor supply and demand for labor in the State."

Collective tenure on grazing land in Montana, G. H. Craig and C. W. Loomer. (Coop. U. S. D. A.). (*Montana Sta. Bul. 406* (*1943*), *pp. 59+, illus. 4*).—This study has been planned to present a short résumé of the progress of certain forms of collective tenure and a medium for classifying the problems involved—their urgency, their relation to the general economy, especially in its land control aspects, and possible solutions or adaptations. It is written primarily for stockmen who are already participating in collective tenure activities or who contemplate doing so.

Under the heading of common forms of collective tenure, a discussion is given of State grazing districts, soil conservation districts, and private corporations and partnerships. As problems of collective tenure there are taken up the organization of the group, stabilizing tenure, allocation of grazing privileges, and finance. The outlook is also discussed. An appendix gives statistical tables as to the gross area of cooperative grazing districts in Montana, seletced years 1935–40; the number of members, grazing season, and grazing fees, 1940; and a brief comparison of Montana's soil and grass conservation district laws.

Land subdivision in the New Jersey pines, J. F. Hauck and A. T. M. Lee. (Coop. U. S. D. A.). (*New Jersey Stas. Bul. 701* (*1942*), *pp. 52, illus. 14*).—This second report (E. S. R., 82, p. 401) presents an analysis of subdivisions as a whole in relation to all types of properties, their influence upon trends in township finance, and the legal and administrative measures now available for the correction of the problems that have been raised. The 10 pine area townships in Burlington County serve as the subject for the detailed analysis and as the basis for developing remedial measures adapted to the entire pine area.

State and local financial relations in Texas, H. C. Bradshaw (*Texas Sta. Bul. 618* (*1942*), *pp. 26*).—Continuing this series (E. S. R., 86, p. 696), this bulletin "outlines the State and local relations growing out of the general laws respecting budgeting, assessing and collecting taxes, accounting, auditing, public reporting, and the management of debts. . . .

"On the basis of this study, it is evident that State and local financial relations in Texas can be improved in several respects. . . . Fortunately, the coordinated system which is suggested would cost no more, and possibly less, than the present inadequate system is costing the citizens of Texas."

[Motortruck use in Illinois] (*Illinois Sta., 1942, AE–1915, pp. 12; AE–1949, pp. 18+, illus. 14; AE–1982, pp. 19+, illus. 5; 1943, AE–2000, pp. 13+, illus. 3*).—The first of these four contributions deals with Market and Return Loads Hauled by Livestock Trucks in Illinois, by R. C. Ashby; the second with Tire-Use Expectancy of Trucks Hauling Farm Products, Illinois, 1942; and the third and fourth with surveys of motortruck use in Douglas and Henderson Counties, respectively, both by Ashby and B. D. Parrish.

Legal phases of cooperative associations, L. S. Hulbert (*U. S. Dept. Agr., Farm Credit Admin. Bul. 50 (1942), pp. 456+*).—This is a third and greatly enlarged revision by the author of his original publication, first issued as Department Bulletin 1106 of the U. S. Department of Agriculture (E S. R., 48, p. 189).

Trends of green pea production and prices by areas, W. Kling (*U. S. Dept. Agr., Bur. Agr. Econ., 1943, F. M. 38, pp. 25+, illus. 3*).—This is a statistical summary of data on green pea production for market and processing and of price trends, mostly from 1918 to 1942.

World wheat survey and outlook, January 1943, M. K. Bennett, H. C. Farnsworth, and V. P. Timoshenko (*Wheat Studies, Food Res. Inst. [Stanford Univ.], 19 (1943), No. 4, pp. 121–150+, illus. 4*).—"The shifting of territorial control only slightly curtailed wheat supplies immediately available to Axis-controlled areas of Europe, but German prospects for future supplies from southeastern Russia are vanishing. To Soviet Russia the shifting meant greater immediate stringency of bread supplies, but a gain of resources for the future. . . The supply position of Soviet Russia, now uncomfortable rather than desperate, seems likely to worsen before the next harvest unless numerous problems of transport can be solved. Wheat shortages are reported in the Middle East, India, and China, in considerable degree a result of disturbances of transport and hoarding.

"Market prices of wheat in the United States, already far above those in competing exporting countries, fluctuated in reflection of an intragovernmental controversy about the level of wheat price appropriate for a ceiling. Flour-price ceilings were fixed by the O. P. A. at a level which would reflect to wheat less than parity price reckoned on the accepted formula. But this action failed to close the controversy. Legislative elements continue to press for wheat prices no lower than accepted parity plus labor costs."

Rationing: A list of references, A. M. Hannay (*U. S. Dept. Agr., Libr. List 3 (1943), Sup. 1, pp. 51*).—This supplement (E. S. R., 88, p. 111) includes 245 additional annotated references grouped by countries.

RURAL SOCIOLOGY

Back to the country—the rurban trend in Washington's population, C. F. Reuss (*Washington Sta. Bul. 426 (1942), pp. 33, illus. 6*).—The rurban population, living outside an incorporated town but not on farms, is analyzed. More than half of Washington's population increase during the past decade was in the rurban group, and in 1940, 20 out of every 100 Washington population were rurban. Much of the farm population of western Washington is closely related to the rurban population. In contrast, town and city growth during the 1930–40 decade was at the lowest rate on record, so urban population was stable. The war emergency is having a decided influence on the distribution of population in the State.

Culture of a contemporary rural community: Harmony, Georgia, W. Wynne (*U. S. Dept. Agr., Bur. Agr. Econ., Rural Life Studies No. 6 (1943), pp. 58+, illus. 6*).—This includes a fictional characterization of the community and a discussion of the history and background of the settlement, the people, the community, the farmer's expanding world, and integration and disintegration in community and individual life. To a greater extent than any other studied in the series (E. S. R., 88, p. 406), this community "presents a strong biracial adjustment."

Community planning in Eddy County, New Mexico, S. Johansen and M. Rossoff. (Coop. U. S. D. A.). (*New Mexico Sta. Bul. 297 (1942), pp. 20, illus. 1*).—As a result of this study the authors recommended participation in a planning program by representation of all rural neighborhoods in an area. More attention should be given to the social as well as the economic resources, including more adequate health, hospital, and medical facilities for sparsely populated areas; better coordination of the schools and community; and a recreational program for the benefit of youth. Leadership representative of all the different elements of each community should be stimulated.

A church call and a church challenge, W. E. Garnett and A. S. Riffenburgh (*Virginia Sta., Rural Sociol. Rpt. 25 (1943), pp. 18+, illus. 2*).—This conference of church leaders was called to consider questions related to Virginia's marginal population as reported in Bulletin 335 (E. S. R., 86, p. 698). A report of the findings committee which was adopted by the conference is included. Among its recommendations were "that the questions raised by Virginia's large marginal population be called to the attention of ministers throughout the State; . . . that urban churches be kept informed concerning the problems of rural life, especially of marginal groups, and be encouraged to feel a responsibility for sharing in solution of these problems; . . . [and] that on all levels of the church program a special emphasis be placed on rural work so that service in the rural field can carry as much security and prestige as service in urban centers. This would probably require: Equalization of salaries, possibly by subsidy to certain poorer rural churches; selection of highest quality personnel for work in rural areas; [and] cooperation among various denominations, and even a combination of churches in some sparsely settled sections."

Balancing labor and land resources for wartime production: Suwannee County, Florida, J. C. Downing, J. C. Council, and S. E. Grigsby. (Coop. Fla. Expt. Sta.). (*U. S. Dept. Agr., Bur. Agr. Econ., 1943, F. M. 39, pp. 35+, illus. 6*).—This is a study of land in relation to labor in wartime production. Data were obtained from 50 farms selected at random as to the man, horse, and tractor labor requirements for the crops most commonly grown in the area. "It is estimated that 550 small farms of four types could be combined to permit 275 small-farm families to move out of the county to work in war industries or to perform farm work in areas with critical problems."

The loss of rural manpower to war industry through migration, P. H. Landis (*Washington Sta. Bul. 427 (1943), pp. 36, illus. 1*).—Movements of migrants, as affected by war conditions, are analyzed for Whitman and Stevens counties for the period from January 1, 1940, to midsummer, 1942.

FOODS—HUMAN NUTRITION

Food, health, vitamins, R. H. A. and V. G. Plimmer (*London and New York: Longmans, Green & Co., [1942], 9. ed., pp. 193+, illus. 3*).—In the preface to this edition (E. S. R., 69, p. 303), the authors state that they have repeated their practice in earlier editions "of discarding 'what once seemed good' and embodying 'what now proves best'." Numerous changes have been made in the colored "square meal" diagram which has always been a feature of the book. The original scheme of squares of different colors to indicate the four classes of foods in a complete diet—fats, seeds, vegetables and fruits, and meats—has been retained but with modifications in the arrangement of foods in each square to differentiate the major and minor vitamins provided by each group. The so-called minor vitamins include vitamin K in the square for fats, the major vitamins for which are A and D; E in the square for seeds, the major vitamin for which is aneurin (thiamin); and P in the square for vegetables and fruits, with C as the major vitamin. In the meat square nicotinic acid, riboflavin, and adermin (pyridoxin) are listed as the major vitamins and the other vitamins of the B group the minor vitamins.

Preservation of foodstuffs (*Indus. and Engin. Chem., 35 (1943), No. 1, pp. 12–105, illus: 85*).—Various aspects of food preservation are presented in the following papers, in several of which emphasis is given to war problems: Food Requirements for Overseas Use, by V. O. Wodicka (pp. 12–15); Food Packaging for Overseas Use, by R. R. Nelson (pp. 16–19); Protection of Foodstuffs Against War Gases, by S. H. Katz (pp. 20–23); Nutritional Aspects of Food Processing, by P. E. Howe (pp. 24–25); Freezing Foods, by D. DeFelice (pp. 26–28) (N. Y. State Expt. Sta.); Cold Storage of Food, by H. C. Lythgoe (pp. 29–38); Canning Technology, by E. J. Cameron (pp. 38–42); Packaging Trends, by A. H. Warth (pp. 43–46); Dehydration of Meat, by H. R. Kraybill (pp. 46–50); Stabilization of Fats and Fatty Foods, by H. S. Mitchell and H. C. Black (pp. 50–52); Dehydration of Fruits and Vegetables, by W. V. Cruess (pp. 53–61) (Univ. Calif.); Conservation of Perishables by Refrigeration, by M. E. Pennington (pp. 62–66); Enrichment of Flour and Bakery Products, by W. H. Cathcart (pp. 66–70); Short-time Pasteurization of Milk, by C. O. Ball (pp. 71–84); Protection of Natural Green Pigment in the Canning of Peas, by J. S. Blair and T. B. Ayres (pp. 85–95); Fruit and Vegetable Juice Preparation and Preservation, by D. K. Tressler, C. S. Pederson, and H. G. Beattie (pp. 96–100 (N. Y. State Sta.); and Acid Detergents in Food Sanitation, by M. E. Parker (pp. 100–105).

Dehydration of foods (*Inst. Food Technol. Proc., Minneapolis, Minn., 1942, pp. 59–116, illus. 19*).—Papers presented at the technical session on dehydration of foods at the June 1942 meeting of the Institute of Food Technologists included the following: Methods for Vitamin Control of Processed Foods, by B. L. Oser (pp. 59–69); The Present Status of Food Dehydration in the United States, by E. M. Chace (pp. 70–89) (U. S. D. A.); Factors Affecting the Quality of Dehydrated Vegetables, by M. B. Davis, C. C. Eidt, M. MacArthur, and C. C. Strachan (pp. 90–98); Significance of Enzyme Reaction to Dehydration of Vegetables, by W. V. Cruess and M. A. Joslyn (pp. 99–100) (Univ. Calif.); and Dehydration—A Needed Food Industry, by S. C. Prescott (pp. 111–116).

Dehydration of fruits and vegetables and their uses, J. G. Woodroof, W. E. DuPree, and H. H. Thompson (*Georgia Sta. Bul. 225 (1943), pp. 35, illus. 16*).—This bulletin, written with particular reference to Georgia conditions, lists 30 vegetables and 5 fruits commonly grown in the State which may be dehydrated in community drying plants. It is indicated that there are opportunities for many home driers and also community driers and a few commercial dehydrating plants within the State. Step-by-step procedures are given for preparing, dehydrating, and packaging fruits and vegetables; this information is also conveniently tabulated along with notes indicating varieties suitable for dehydration. Procedures are given for dehydrating and cooking the dried fruits and vegetables.

Dehydration of fruits and vegetables in the home, G. A. Shuey (*Tennessee Sta. Bul. 183 (1943), pp. 21, illus. 9*).—This bulletin, giving information of practical value, is based on research and experience. "Home methods of drying foods are discussed briefly. Certain principles which govern successful dehydration are explained. Care in the selection of materials is emphasized. A dehydrator found to be satisfactory for home use is described. Directions are given for the preparation, dehydration, packaging, and refreshing of many fruits and vegetables." In addition to the descriptive notes, condensed directions for dehydration are conveniently tabulated.

Recommended dietary allowances (*Natl. Res. Council, Reprint and Cir. Ser., No. 115* (*1943*), *pp. 6+*).—This publication includes the table of daily allowances of calories, protein, calcium, iron, vitamin A, thiamin, riboflavin, niacin, and ascorbic acid adopted by the Food and Nutrition Board of the National Research Council in May 1941, with further recommendations adopted in 1942 for iodine, copper, and vitamin K; a discussion of the purpose and general policies in formulating the allowances; and two sample dietary patterns meeting the recommendations.

A study of the McCloy method for determining normal weight, M. M. Clayton. (Maine Expt. Sta.). (*Child Devlpmt., 13* (*1942*), *No. 3, pp. 215–226, illus. 1*).—The McCloy method of determining normal weight from measurements of height, knee width, chest circumference at the xiphoid level, and bi-iliac hip width (the last two corrected for fat) was used in a 4-yr. study of the nutritional status of grade school children and during 2 yr. in a similar study of college freshmen girls. The results were used to see how the McCloy standards apply to Maine children whose skeletons are on the whole somewhat narrower than those of the Iowa children on whose measurements the standards were based. The large numbers of measurements made, 1,849 sets for the children and 263 for the college students, made it possible also to judge the reliability of the McCloy weight indices as applied to children having widely differing types of bony skeletons and amounts of subcutaneous tissues. Comparisons were also made with the Baldwin-Wood and Pryor weight standards.

Comparisons of the McCloy weight, fat, and limb girth indices and subjective estimates of the nutrition of the subjects showed fairly good correlation for the first two but low correlation for the third. When pairs of children of the same sex and approximately the same height and weight but widely different builds were checked against the McCloy and the Baldwin-Wood standards, the McCloy standards applied better than the Baldwin-Wood except for markedly overweight or underweight children. A comparison of the McCloy and Pryor standards on college students showed that the higher Pryor standards would probably be more nearly correct for the markedly underweight, but that the lower McCloy standards would be more adequate for the slightly underweight, normal, and overweight groups.

A study of the adequacy of diets consumed by grade-school and high-school students in Louisiana, L. C. Coco, M. Moore, G. A. Goldsmith, G. P. Lucas, and H. J. Davis (*Louisiana Sta. Bul. 360* (*1943*), *pp. 10*).—Dietary records showing the food consumed at each meal for a week were obtained during the spring and summer of 1942 from 5,776 high school students in New Orleans and 387 in Crowley, La., and from 545 grade and high school children in other areas of the State; these latter children had been examined by the officials of the State Department of Public Health and at the same time judged and classified in regard to their nutritional status. Each dietary record was evaluated by a score card, according to which the consumption of each of 10 foods or food groups was scored as good, fair, or poor (with corresponding point ratings of 3, 2, or 1), depending upon the number of times it was served during the week. After the foods were classified individually, the total diet was classed either as good, fair, or poor, depending upon the total score derived by summation of the point ratings for each food. A summary of the adequacy of diets consumed by the three groups showed that the number scoring good was small—from 9.0 to 14.5 percent among the white children and from 0.3 to 3.3 among the

Negro children. From 12 to 37 percent of the diets of the white pupils and from 59 to 75 percent of the Negro pupils rated as poor. The authors comment that "these findings lead one to wonder why nutritional deficiency diseases are not more commonly recognized among Negroes."

A break-down of the scores with respect to the adequacy of the use of the 10 protective foods showed that among the white children the consumption of meat or meat substitutes came nearer meeting the present recommendations than it did for any of the other foods. The adequacy scores of the other foods decreased in the following order: Milk; green, leafy, or yellow vegetables; eggs; fruit other than citrus; vegetables other than green or yellow ones; citrus fruit, tomatoes, and raw vegetables (cabbage, green peppers, and radishes); butter; potatoes; and whole-grain cereals. Seven of the protective foods scored good in less than 50 percent of the diets studied.

As a group, the diets of the Negro pupils were much poorer than those consumed by the white pupils. The rank of the protective foods in the diets of the Negro children was quite similar to that in the diets of the white children with the exception of milk, which dropped from second to seventh place. From the results of this study the authors consider that "it is difficult to say specifically which food factors are most often deficient in the diets of school children. The low consumption of whole-grain cereals suggests a deficiency of vitamin B_1 (thiamin). The poor diets which were very low in all fruits and vegetables, milk, and butter, as well as whole-grain cereals, would seem to be very low in minerals, all of the members of the B complex, vitamin C, and vitamin A."

Nutritional status indices for rural and urban Utah school children, A. P. Brown and F. Y. Moser. (Utah Expt. Sta.). (*Child Devlpmt., 13 (1942), No. 2, pp. 101–112*).—Earlier height-weight measurements of 13,871 school children in Utah cities (population 10,000 or more) and 12,913 school children from farms or towns (population not more than 2,500) showed that the city children were generally taller than the country children and weighed more for height and age.[2] In an effort to determine if these differences in size could be attributed to differences in nutrition between the groups, the nutritional status of 136 city and 137 country children between the ages of 8 and 12 yr. was determined by the methods of the American Child Health Association, involving the taking of seven body measurements from which indices are computed reflecting the amounts of musculature, subcutaneous tissue, and weight in relation to size of skeleton.

The percentage distribution of nutritional indices of various grades showed no significant differences between the two groups as to particularly high or particularly low indices. The country girls had the greatest concentration of indices for musculature and for weight in the interval of 50–59 percent, while the other groups had theirs in the 40–49.9 percent interval. This group also was the only one in which the mean for each of the three indices was above 50. Correlation between the various indices was of relatively low order except in the case of weight and musculature for both city and country boys and for city girls, with correlation coefficients of 0.7 or more. The highest correlation for country girls was also between weight and musculature. The country girls had the smallest relative number of scores below 50 with all three nutritive indices. The city girls ran almost twice as high, and the city and country boys ranked between these two groups. "If, therefore, these nutritional indices really do indicate state of nutrition as reflected in relationship of soft tissues to bony structure, the country girls would appear to be in the best state of nutrition, the country boys second, the city boys third, with the city girls in the poorest state of nutrition." By two other methods of comparison of the data, the country girls also ranked above the other groups.

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[2] Utah Sta. Bul. 266 (1936), pp. 22+, illus. 6.

In view of these findings, the authors conclude that the differences in height and weight measurements of the country and city children cannot be attributed to recent nutrition and that the nutritional status indices of the Child Health Association do not identify with definiteness the nutritional status of children in this study.

The nutrition of Virginia people as indicated by the diets of school children, G. Parker (*Virginia Sta., Rural Sociol. Rpt. 24 (1942), pp. 72+, illus. 5*).—This report (Nutrition Report No. 3) presents the findings of the third survey, made in April 1942, of the dietary status of children in 55 rural and 6 urban schools in Virginia (E. S. R., 88, p. 276). Of these schools, chosen to furnish as accurate a cross section of the general population as possible, 9 of the rural schools were Negro and the remaining 46 white. The schedule method of obtaining data and the evaluation of the schedules to determine the adequacy of the diets were carried out by procedures used in the previous studies. The results are discussed at some length on the basis of the data presented. Evidence obtained indicated that the school children were not eating enough of the essential and protective foods for promotion of the best health. About 75 percent of the children reported that they ate the foods served to their families. "In all protective foods combined, with the exception of butter and cream, approximately 30 percent of those reporting were under 50 percent adequately nourished. In some of the specific protective food classes—namely, whole-grain cereals and vegetables. other than green, leafy, and yellow—the adequacy for more than two-thirds of the children was less than 50 percent. Approximately one-third showed a milk inadequacy of 50 percent or more. Meat, fish, poultry, and eggs was the only food class for which the average was 100 percent adequacy for all children." It is considered that the poor diet of the average family was due not so much to a lack of food as to the consumption of too many refined foods and perhaps due to the lack of knowledge of the constituents of a balanced diet or lack of appreciation of its importance, or to food habits and customs. The study indicates that the deficiencies found were as much related to the types of food that the people were choosing to eat as to economic limitations.

Home production of food supplies, J. J. Bird (*Tennessee Sta. Rpt. 1941, pp. 14–15*).—This progress report (E. S. R., 87, p. 464) gives a résumé of the findings by E. M. Schuchardt of the physical status of the 286 children examined in a study of the relation of diet to physical status. It was observed that "even though many of the children examined were reared on extremely unbalanced diets according to accepted standards, relatively few showed distinct symptoms of malnutrition."

A comparison of rats fed on evaporated milk with those fed a "milk" in which the naturally occurring fat has been replaced by coconut oil, S. Freeman and A. C. Ivy (*Jour. Dairy Sci., 25 (1942), No. 10, pp. 877–881, illus. 1*).—A comparison of the growth rate over periods of 49–97 days of rats receiving evaporated and filled milk ad libitum as supplements to the same basal diet showed somewhat greater growth rate on the evaporated than on the filled milk for both periods. The difference was statistically significant for the 97- but not for the 49-day period. The percentages of bone ash and liver were similar for the two groups for both periods, but there were more volatile fatty acids in the fat of the filled milk group. Hemoglobin values obtained on 10 rats from each group after 49 days on the experiment were similar for the two groups.

Prevalence of anemia in college boys and girls, O. SHEETS (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 3*, *pp. 1, 7*).—In a survey of the hemoglobin levels and red cell counts of nearly 1,200 college men and women at Mississippi State College and Mississippi State College for women, hemoglobin was found to range from 11.2 to 18.3 gm. per 100 cc. in the men and from 9.3 to 15 gm. in the women; red cell counts in millions per cubic centimeter ranged from 3 9 to 6.2 and from 3.7 to 5.6 in these two groups, respectively. The results, compared with the range of values reported by Wintrobe for the blood of normal men and women, showed that more than one-fourth of the college men and almost one-third of the college women had hemoglobin levels below the range for normal individuals, while about 4 percent of the men and 3½ percent of the women had red blood cell counts below the normal level. It is considered that anemia in the college students, as evidenced by these blood pictures, is probably of dietary origin.

Thiamine clearance as an index of nutritional status, D. MELNICK and H. FIELD, JR. (*Jour. Nutr.*, *24* (*1942*), *No. 2*, *pp. 131–138*, *illus. 4*).—A simpler and more reliable procedure for the detection of thiamin deficiency than the one used in previous studies (E. S. R., 83, p. 853) is described, with data illustrating its reliability. In four different tests on 23 normal and 14 thiamin-deficient adult subjects, good correlation was found between the basal 24-hr. urinary excretion of thiamin, the fasting 4-hr. excretion, the response to the oral administration of 5 mg. of thiamin, and the 4-hr. excretion following intramuscular injection of the vitamin in a dosage of 0.35 mg. per square meter of body surface, or approximately 0.65 mg. for the average male subject. In the last-named test all of the normal subjects and none of the deficient excreted more than 0.05 mg. of thiamin during the 4-hr. period following the dosage. Only 6 of the normal subjects excreted less than 0.075 mg. of thiamin or 50 percent above the minimal level of excretion, a value found in all of the other tests to be critical. Advantages pointed out for this test are that errors encountered in routine collection of 24-hr. urine samples are avoided, variations in rate and degree of absorption of the vitamin when taken orally are eliminated, and the quantitative intake of the dose is not dependent on the cooperation of the patient.

Vitamin B_1 (thiamine) requirement of man, D. MELNICK (*Jour. Nutr.*, *24* (*1942*), *No. 2*, *pp. 139–151*, *illus. 3*).—Of the more than 175 normal and deficient subjects used in the previously reported urinary excretion studies conducted by the author and associates, 116 found to have no disorders which might interfere with absorption, storage, utilization, or excretion were used in the thiamin excretion studies here reported. Of these, 66 consisting of hospital staff members, laboratory technicians, and obviously well-nourished hospital patients constituted the normal group. The remaining 50 showed clinical signs and symptoms of thiamin deficiency and had dietary histories of inadequate thiamin intake. These persons were used in the thiamin excretion studies here reported, some of which have been noted in earlier papers.

All of the subjects were given the four laboratory tests listed in the paper noted above, and the results have been compared with the clinical evaluation of the subject in which 34 had been classed as definitely deficient, 16 borderline, and 66 normal. Some of the group classed as normal on clinical examination gave borderline urinary values in more than one type of test, others in only one, and a small number considered as deficient or borderline clinically gave normal values in the first two of the laboratory tests. It is concluded that "for purposes of determining adequacy of nutrition, the normal individual should be regarded as one who passes all of the laboratory tests."

NOTES

Arizona Station.—The station has recently been presented by the citrus growers and packers of the Salt River Valley district with a 40-acre bearing citrus orchard about 8 miles southeast of Phoenix. This orchard will be used for experimental work by the department of horticulture and makes the seventh experimental farm to be operated by the station.

Dr. William E. Martin, associate horticulturist, has resigned to become senior agriculturist with the U. S. D. A. Office of Foreign Agricultural Relations and is now located in Peru. Recent additions to the staff include Dr. Winston W. Jones as associate horticulturist, Dr. W. P. Bitters and Robert C. Keswick as assistant horticulturists, Emily C. Caldwell as research assistant in nutrition, and Earl F. Stark as assistant chemist.

Arkansas University and Station.—T. R. Moberg, assistant professor and assistant in forest economics, and A. C. Mowery, instructor in animal industry, have resigned. J. Ralph Shay has been appointed assistant professor of plant pathology.

Connecticut [New Haven] Station.—Dr. H. B. Vickery, chief biochemist, has been elected a member of the National Academy of Sciences. Dr. Douglas E. Greenwood, investigator in entomology in the New York State Station, has been added to the staff to work on wireworm control.

Georgia Station.—The board of regents of the University System of Georgia, appointed under provisions of an act of the Georgia Legislature which adjourned in March, has been organized to include an agricultural committee. This committee has among its duties the visitation of the work of the station.

The Georgia Sheep Breeders Association held its annual meeting and sheep shearing demonstration at the station May 13. The association is sponsoring the raising of increased numbers of sheep in Georgia, especially in the northern half of the State.

Greatly increased numbers of requests for station bulletins on vegetable gardening and dehydration of foods are indicative of the widespread interest in these subjects in the State.

Purdue University and Indiana Station.—At the recent session of the Indiana Legislature, an appropriation of $5,000 was made to supplement a previous similar allotment for canning crops research. The funds will be used by the station in developing better adapted varieties, testing new varieties for the control of disease, and similar purposes.

Dr. George D. Scarseth, professor of soils and soil chemist, has been appointed head of the department of agronomy, effective July 1, succeeding A. T. Wiancko, who is to retire from this position after 40 years of service. Eric W. Stark, chief of the division of forest products research of the Texas State Forest Service, has been appointed associate professor of forestry and associate in forestry and conservation. Dr. R. E. Lincoln, associate in botany; C. Gordon Fredine, assistant professor and associate in forestry and conservation; and H. E. Jones, technical assistant in agronomy, have been granted leave of absence for military service.

Michigan Station.—The legislature has made a special appropriation of $45,000 for research during the year beginning July 1 dealing especially with wartime problems.

The resignations are noted of Dr. John W. Crist as research associate in horticulture and Fred H. Vogel as research associate in forestry, the latter to accept a position with the U. S. D. A. Forest Products Laboratory. William Robertson has been appointed research associate in horticulture to conduct investigations dealing with the commercial canning of fruits and vegetables.

Montana College and Station.—Dr. R. R. Renne, head of the department of agricultural economics, who has been State price officer since July 1, 1942, has returned to resume his former duties. Dr. D. J. Pletsch, assistant professor of zoology and entomology and assistant entomologist, has been granted leave of absence for service as first lieutenant in the Sanitary Corps.

Nevada Station.—A recent bulletin entitled More Beef From the Same Number of Cattle on Nevada Ranches has proved so timely that a second edition has been issued in advance of the general distribution.

Minnesota University.—Dean E. M. Freeman, of the College of Agriculture, Forestry, and Home Economics, retired July 1 and was succeeded by Dr. Henry P. Schmitz, professor and chief of the division of forestry.

New Mexico Station.—In recognition of his contributions toward the development of agriculture in the Southwest, Director Fabian Garcia has been granted the honorary degree of doctor of science by the University of New Mexico. D. A. Hinkle, assistant agronomist, has been given leave of absence to enter the United States Navy.

Cornell University and Station.—Edward A. White, professor emeritus and head of the department of floriculture and ornamental horticulture from 1913 till his retirement in 1939, died May 13, aged 70 years. A native of Massachusetts and a graduate of the Massachusetts College in 1895, he had also served on the staffs of that college, the Baron de Hirsch School, the Texas College, and the Connecticut College. He was the author of a number of books, including Principles of Floriculture (1916), Principles of Flower Arrangement (1923), American Orchid Culture (1927), and American Chrysanthemum Culture (1930).

Dr. Charles S. Hobbs has been appointed extension associate professor of animal husbandry.

New York State Station.—Former Director P. J. Parrott has been given the honorary D. Sc. degree by the Kansas College.

The resignations are noted of Dr. T. A. Merrill, assistant professor of pomology and in charge of the Vineyard Laboratory at Fredonia, to accept a position with the Michigan College; Charles J. Tressler, assistant professor, and Dr. Floyd E. Lovelace, investigator in chemistry, to engage in commercial work; Dr. Fred W. Tanner, Jr., investigator in chemistry, to take up rubber research for the U. S. D. A. Regional Research Laboratory at Peoria, Ill.; and Leslie O. Weaver, investigator in plant pathology, to become extension plant pathologist in the Pennsylvania College.

Dr. Otto A. Reinking, head of the division of plant pathology, has been granted leave of absence to join a mission from the United States to Costa Rica, where it is hoped to establish a quinine industry. More than 100,000 cinchona seedlings propagated in U. S. D. A. greenhouses will form the nucleus for the new venture.

Ohio Station.—Dr. Harold W. Batchelor, associate in microbiology, and R. C. Headington, assistant in rural economics and sociology, have been granted leave of absence for military service. Elizabeth Pascoe has been appointed assistant in the Federal Soft Wheat Laboratory.

Oklahoma Station.—Recent State appropriations provide for establishment of a commercial vegetable substation and for expansion of work in pasture establishment and utilization, wheat and corn breeding, milling and baking tests with wheat, and research in veterinary medicine.

Clemson College and South Carolina Station.—The death at Mountainville, N. Y., in his eighty-second year is noted of David O. Nourse, associate professor of animal husbandry and dairying from 1907 to 1910 and a pioneer in station work in agriculture. Graduating from the Massachusetts College in 1883, he worked for a short time in the recently organized Massachusetts State Experiment Station. After several years in commercial orcharding and on his home farm in Massachusetts, he went to the Virginia Polytechnic Institute, where from 1891 to 1906 he was professor of agriculture, agriculturist of the station, and manager of the college farm In the spring of 1910 he took over the management of a previously purchased farm near Newburgh, N. Y., and during the following winter assisted in carrying on poultry experiments in the Rhode Island Station. His most notable work was probably that at the Virginia Polytechnic Institute, and in 1930 that institution conferred on him a special testimonial in recognition of his "constructive work in the development of scientific agriculture."

Tennessee University and Station.—Dr. M. Jacob, associated with the university well-nigh continuously since 1900, died March 22 at the age of 64 years. A native of Pennsylvania, he received his veterinary degree from the University of Pennsylvania in 1899, and from 1904 to 1905 he was professor of veterinary practice at the Iowa College. Returning to Tennessee as professor of veterinary science, he also served as State Veterinarian from 1915 to 1921, when he was appointed head of the animal husbandry department for both resident teaching and the station. In 1937 he became dean of the College of Agriculture. He had been treasurer of the American Veterinary Medical Association for nearly 25 years and was a past president of the U. S. Livestock Sanitary Association, the Southern States Veterinary Medical Association, and other organizations.

Dr. C. E. Brehm, director of the agricultural extension service of the university, has also been appointed dean of the College of Agriculture. N. E. Fitzgerald, head of the department of agricultural education, has been appointed dean of the College of Education, and Neal D. Peacock, head of the department of horticulture, has become vice director of resident teaching in the College of Agriculture.

Virginia Polytechnic Institute and Station.—Dr. Walter Beal Ellett, head of the department of agricultural chemistry in the college and chemist in the station, died May 12 at the age of 68 years. A native of Virginia and a graduate of the institute in 1894, he received the Ph. D. degree from the University of Göttingen in 1904. His service had been entirely in Virginia, first as instructor in chemistry in the institute from 1896 to 1900 and 1904 to 1906, then as assistant chemist in the station from 1896 to 1901 and 1904 to 1906, as station chemist since 1906, and as professor of agricultural chemistry since 1915. He had worked on a variety of projects, including soil fertility and nitrification, the protein and energy requirements of cattle, and the role of sulfur and phosphoric acid in soils.

Dr. A. L. Grizzard has resigned as associate agronomist.

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EXPERIMENT STATION RECORD

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RECENT WORK IN AGRICULTURAL SCIENCE[1]

AGRICULTURAL AND BIOLOGICAL CHEMISTRY AND MICROTECHNIC

Electrode polarization in dielectric constant measurements, W. G. SMILEY and A. K. SMITH. (U. S. D. A.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 3, pp. 624–628, illus. 2*).—The authors describe an apparatus for conductance and capacitance measurements on conducting solutions from 1 kc. to radio frequencies, and give results on the polarization capacitance of platinum electrodes in very dilute solutions of sulfuric acid, carbonic acid, and sodium chloride, alone and with glycine, gelatin, and acetone. In the range from 1 to 30 kc. the polarization capacitance did not follow the inverse square root law. An empirical equation which does describe the variation of polarization capacitance with frequency is given. Polarization capacitance increases with decreasing pH. Methods of correction in dielectric constant measurement are discussed.

Adsorption of nitrogen and the mechanism of ammonia decomposition over iron catalysts, S. BRUNAUER, K. S. LOVE, and R. G. KEENAN. (U. S. D. A. et al.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 4, pp. 751–758*).—Adsorption rate equations and a kinetic equation for the rate of ammonia decomposition on a doubly promoted iron catalyst are derived.

The effect of alkali promoter concentration on the decomposition of ammonia over doubly promoted iron catalysts, K. S. LOVE and S. BRUNAUER. (U. S. D. A.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 4, pp. 745–751, illus. 3*).—A series of doubly promoted catalysts was prepared by treating an aluminum oxide promoted catalyst with potassium hydroxide solutions of varying strengths. By adsorption measurements the total surface areas and the surface concentrations of the promoters were determined for each catalyst, and the effects of temperature and gas composition on the kinetics of ammonia decomposition were investigated. The catalyst most active toward ammonia decomposition was obtained when about 30 percent of the catalyst surface was covered by the alkali promoter.

The constitution of arabo-galactan, II–IV, E. V. WHITE. (Univ. Idaho). (*Jour. Amer. Chem. Soc., 64 (1942), Nos. 2, pp. 302–306, illus. 1; 7, pp. 1507–1511, illus. 1; 12, pp. 2838–2842*).—The three papers here dealt with extend an investigation previously noted (E. S. R., 86, p. 580).

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[1] The publications abstracted in these columns are seldom available for distribution by the Office of Experiment Stations. In general, application should be made to the Office of Information of the U. S. Department of Agriculture, Washington, D. C., for publications of the Department; to the directors of the State agricultural experiment stations, as listed on page 3 of the cover of this issue, for publications of the several experiment stations; and to publishers of books and journals for material issued by them. Microfilms and photostatic copies, the latter legible without magnifying equipment, may be purchased from the Library, U. S. Department of Agriculture, Washington, D. C. Rates and other details are explained in a previous issue (E. S. R., 87, p. 324).

II. *The isolation of heptamethyl- and octamethyl-6-galactosidogalactose through partial hydrolysis of methylated arabogalactan.*—Octamethyl-6-*d*-galactosidogalactose was isolated from the partial hydrolysis products of arabo-galactan methyl ether, demonstrating the 1–6 linkage of terminal galactose residues in larch gum. Structural proof of the identity of the new compound is given. Heptamethyl-6-*d*-galactosidogalactose, isolated from the partial hydrolysis products of arabo-galactan methyl ether, is shown to be the 2,4-dimethyl-6-tetramethyl-galactosidogalactose derivative. The formation of this compound illustrates further the 1–6 linkage of terminal galactose residues in larch gum and demonstrates their branched chain linkage. The galactose residues of arabogalactan occurring as 2,4-dimethyl galactose in the hydrolysis products of arabo-galactan methyl ether are shown to be joined to one another in the original gum through the 1–6 position in some cases and through the 1–3 position in other instances.

III. *The location of the arabinose component.*—Fractional distillation of the glycosidic sirup obtained upon methanolysis of the methyl ether of the arabo-galactan obtained from the water-soluble gum of the western larch, *Larix occidentalis*, yielded, as the main fractions, dimethyl-methyl-galactoside, trimethyl-methyl-galactoside, and a mixture of tetramethyl-methyl-galactoside and trimethyl-methyl-arabinoside. On the basis of the 6 : 1 molecular ratio of galactose to arabinose in the original polysaccharide, the molecular ratio of the glycosidic components is shown to be 3 : 1 : 2 : 1, respectively, and the arabinose component of arabo-galactose is to be joined to a trilinked galactose residue. The position of this linkage is found to be through the 1 position of the arabinose component of the 6 position of the galactose residue.

IV. The structure of the repeating unit.—Partial hydrolysis of arabo-galactan methyl ether yielded a variety of fission fragments including 2,3,5-trimethyl-methyl-*l*-arabinoside, octamethyl- and heptamethyl-6-*d*-galactosidogalactose, and a residue comprising mainly 2,4-dimethyl galactose anhydride units. The individual dimethylated residues were shown to be united with each other through the first position, through the first and third positions, through the first and sixth positions, and through the first, third, and sixth positions, respectively. The proportion of 2,4-dimethyl galactose anhydride linked through the first and sixth positions was considerably in excess of that joined at the first and third positions. A tentative conclusion as to the structure of the repeating unit of arabo-galacan is presented.

The significance of the "V" X-ray diffraction patterns of starches, R. S. Bear. (Iowa Expt. Sta.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 6, pp. 1388–1392, illus. 7*).—Five varieties of the V type of starch X-ray diffraction powder pattern are described, and conditions for their production are given. It is pointed out that in the study of the V modifications of starch are to be sought important connections between iodine-color, Schardinger dextrin formation, and the behavior of starch molecules during the gelatinization process. Relation of these properties to current ideas of straight-, branched-, and helical-chain starch molecules is briefly discussed with reference to the X-ray evidence.

The molecular weights of the Schardinger alpha and beta dextrins, D. French and R. E. Rundle. (Iowa Expt. Sta.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 7, pp. 1651–1653*).—The molecular weights of these dextrins were accurately determined by X-ray diffraction and crystal density measurements. The α-dextrin was found to contain six glucose residues per molecule and was renamed cyclohexaamylose; the β-dextrin was found to contain seven glucose residues and was renamed cycloheptaamylose.

The hydrolysis of arginine by streptococci, C. F. Niven, Jr., K. L. Smiley, and J. M. Sherman. (Cornell Univ.). (*Jour. Bact., 43 (1942), No. 6, pp. 651–660*).—The authors found most species of streptococci to hydrolyze arginine with the production of ammonia. The outstanding exceptions were those "somewhat closely related nonhemolytic species which are loosely designated as the 'viridans streptococci.'" The authors showed also that the streptococci belonging to the Lancefield serological groups A to G hydrolize arginine, this property being quite as characteristic of the nonhemolytic strains and varieties as of hemolytic cultures; and that *Streptococcus lactis* hydrolyzes arginine, whereas the closely related *S. cremoris* lacks this ability or attacks arginine very slightly.

Freezing points of binary mixtures of diphenylamine and other organic compounds, O. A. Nelson and L. E. Smith. (U. S. D. A.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 5, pp. 1057–1059, illus 1*).—The crystallization temperatures, eutectic composition, and eutectic temperatures were determined for the binary systems diphenylamine and phenoxathiin, diphenylamine and *p*-nitrophenetole, diphenylamine and 1-nitronaphthalene, diphenylamine and dibenzofuran, and diphenylamine and phenothiazine. From the data obtained the freezing point constants were calculated for the six compounds investigated

The reaction of formaldehyde with 1 (—) -asparagine, D. C. Carpenter and F. E. Lovelace (N. Y. State Expt. Sta.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 12, pp. 2899–2902, illus. 3*).—The reaction between solutions of (1—)-asparagine containing an equivalent of sodium hydroxide and various amounts of fomaldehyde was followed by means of polariscopic and H-ion measurements, and estimation of unreacted aldehyde. 1(—)-Asparagine was found to react with formaldehyde, mole per mole, to form methylene-1(—)-asparagine. The latter reacted further with 1 additional mole of formaldehyde to form an unstable compound of unestablished constitution which readily loses aldehyde.

The synthesis of condensed ring compounds.—VIII, Further applications of the dienyne double addition reaction, L. W. Butz and L. M. Joshel (U. S. D. A.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 6, pp. 1311–1313*).—Dicyclohexenylacetylene combines with 2 moles of methyl or ethyl fumarate to form a 6,7,11,12-tetracarboalkoxy-8(14),9-chrysitadiene. A stereoisomeric tetramethyl ester was obtained via the adduct from this dienyne and maleic anhydride. The latter diene ester readily absorbs 1 mole of hydrogen, whereas the diene ester from methyl fumarate absorbs no hydrogen under the same conditions. A 3-methoxy-6,7,11,12-tetracarbomethoxy-8(14),9-steradiene was obtained from 4-methoxycyclohexenylcyclopentenylacetylene and methyl fumarate.

Chemical constitution and the tanning effect.—I, Simple esters and polyesters of gallic acid, A. Russell and W. G. Tebbens, Jr. (Univ. N. C.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 10, pp. 2274–2276*).—Simple esters and polyesters of gallic acid were prepared and tested for leather forming properties. None of the simple esters showed such properties. The leather forming properties of the polyesters of gallic acid with various polyhydric alcohols were poor but definite, and seemed to improve on ascending the series.

The optical configuration of glutamic acid isolated from casein hydrolyzates by six procedures, J. C. Opsahl and L. E. Arnow. (Univ. Minn.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 9, pp. 2035–2039*).—Glutamic acid hydrochloride was isolated from hydrolyzed casein by six different procedures. The percentages of *d*-isomer in the isolated samples varied from 2.5 to 6.2 percent. Like isolations from a casein hydrolyzate to which had been added a known amount of *d,l*-glutamic acid were also carried out. The methods yielding samples having *d*-isomer contents closest to the theoretical content were the pyrrolidone-carboxylic acid procedure and the cuprous oxide procedure. Two modifications of the Foreman procedure yielded samples containing, respectively, from 76 to 89 and from 82 to 96 percent of the theoretical content of *d*-isomer. The poorest percentage yields of *d*-isomer were obtained with the zinc oxide procedure.

Methods for isolating glutamic acid by the pyrrolidone-carboxylic acid procedure and the zinc oxide clarification procedure, and modifications of the barium salt and butyl alcohol extraction procedures, are described.

The dehydration of 1,5-hexadiene-3-ol to 1,3,5-hexatriene and 1,3-cyclohexadiene, L. W. Butz. (U. S. D. A.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 8, pp. 1978–1979*).—The nature of the reaction and its products is briefly discussed.

Kinetics and mechanism of 2,6-di-iodotyrosine formation, C. H. Li. (Univ. Calif.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 5, pp. 1147–1152, illus. 1*).—The rate of 2,6-di-iodotyrosine formation has been studied in acetate buffers at 25° [C.] and found to be that of a bimolecular reaction. A mechanism for the iodination of phenols which is shown to be in agreement with the experimental observations is proposed. In high alkaline solution the iodination reaction is instantaneous if the concentration of hypoiodous acid or hypoiodite ion is maintained. The iodate ion does not react with phenol. Thus phenol is very suitable in determining the rate of hypoiodite ion decomposition.

Certain derivatives of the octadecenoic acids.—I, The p-phenylphenacyl esters. II, The S-benzylthiuronium salts, J. P. Kass, J. Nichols, and G. O. Burr. (Univ. Minn.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 5, pp. 1061–1062*).—The *p*-phenylphenacyl esters of oleic, elaidic, linoleic, linolelaidic, linolenic, β-eleostearic, and α-tetrabromostearic acids were prepared. All had good melting points. Among the unsaturated derivatives only the esters of the first two acids, already known, were found to have the calculated I. V., however.

The S-benzylthiuronium salts of the above unsaturated acids were found unsuited for purposes of identification because of impurity, instability, similarity of melting point, and dependence of the melting point on rate of heating. The appearance of these derivatives varied from crystalline to noncrystalline with the diminishing melting point of the parent acid. An improved procedure, avoiding formation of mercaptans, is given for the recovery of the acids from the thiuronium salts.

The freezing point of phenothiazine, L. E. Smith and O. A. Nelson. (U. S. D. A.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 2, pp. 461–462, illus. 1*).—Using a copper-constantan thermocouple in an apparatus described and illustrated by a diagrammatic drawing, the authors established the freezing point of pure phenothiazine as 185.11±0.02°. From the results obtained it became evident that to obtain phenothiazine of the highest purity the compound must be sublimed under carefully controlled conditions. When phenothiazine was recrystallized after sublimation the product had a significantly lower freezing point. Repeated recrystallizations of the original material did not raise the freezing point of the crystals obtained above 184.21±0.02°.

5-Amino- and 1-aminobenzo(f)quinolines and derivatives, E. R. Barnum and C. S. Hamilton. (Univ. Nebr.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 3, pp. 540–542*).—These amino compounds and some derivatives of possible pharmacological interest were synthesized.

The diastereoisomerism of the 9,10,12-trihydroxystearic acids and the geometric configurations of ricinoleic and ricinelaidic acids, J. P. Kass and S. B. Radlove. (U. S. D. A.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 10, pp. 2253–2257*).—The partial oxidation of ricinoleic and ricinelaidic acids with alkaline permanganate and with peracetic acid has resulted in the four distinct diastereoisomeric 9,10,12-trihydroxystearic acids (two interrelated pairs) expected from theoretical considerations. The α- and β-trihydroxystearic acids,

m. p. 112° and 138°, and $[\alpha]^{23}_{D}$—6.6° and —11.6° in acetic acid (or —2.9° and —3.9° in ethanol), respectively, were obtained by the oxidation of ricinoleic acid with alkaline permanganate or of ricinelaidic acid with hydrogen peroxide in acetic acid. The γ-trihydroxystearic acid, previously unreported, and the δ-isomer, m. p. 87° and 110°, and $[\alpha]^{23}_{D}$+21.8° and —38.7° in acetic acid (or +19.1° and —26.6° in ethanol), respectively, were obtained by the oxidation of ricinelaidic acid with alkaline permanganate or of ricinoleic acid with hydrogen peroxide in acetic acid. The optical activities of the four trihydroxystearic acids, previously unreported for three of them, were related to the cis- and trans-structures of the parent ricinoleic and ricinelaidic acids, respectively.

Sterols, CXXV–CLII, R. E. Marker, A. C. Shabica, H. M. Crooks, Jr., R. B. Wagner, E. M. Jones, E. L. Wittbecker, D. L. Turner, T. S. Oakwood, E. Rohrmann, P. R. Ulshafer, and E. L. Wittle. (Pa. State Col.). (*Jour. Amer. Chem. Soc., 64 (1942), Nos. 1, pp. 147–149, 180–181; 2, pp. 210–223, 468–469; 3, pp. 481–482, 720–722; 4, pp. 809–824; 5, pp. 1228–1229; 6, pp. 1273–1285; 7, pp. 1653–1658; 8, pp. 1842–1847; 9, pp. 2089–2097*).—Of the 28 papers here noted, Nos. CXXV, CXXVI, CXXXI, CXXXII, CXXXIII, CXXXV, CXXXVI, CXXXVII, CXXXIX, CXLVI, CXLVII, CXLVIII, and CL deal with the sapogenins. The remainder are as follows: CXXVII, 17-Bromopregnan-3(β)-ol-20-one; CXXVIII, 17.21-dibromopregnan-2(β)-ol-20-one and its conversion to pregnanol-3(β),21-diol-20-one; CXXIX, rearrangement of 17-bromopregnan-3(β)-ol-20-one; CXXX, 3,6-diketo sterols and their reduction products; CXXXIV, some observations on the structure of ouabain; CXXXVIII, the conversion of pregnan-3(β)-ol-20-one into etio-cholan-3(β)-ol-17-one; CXL, 17-bromo-allo-pregnanone-20 and 17,21-dibromo-allo-pregnanone-20; CXLI, 3(α),11,12-trihydroxycholanic acid; CXLII, 17-methyl-pregnan-3(β)-ol-20-one and related compounds; CXLIII, the conversion of 5-pregnen-3(β)-ol-20-one to dehydro-iso-androsterone; CXLIV, some 16-alkyl-pregnenolones and progesterones; CXLV, 21-benzal-5-pregnen-3(β)-ol-20-one and allied compounds; CXLIX, the hypoiodite oxidation of pregnanolones and pregnenolones; CLI, rearrangement of 17,21-dibromo-allo-pregnan-3(β)-ol-20-one acetate; and CLII, rearrangement of 16,17-dibromopregnan-3(β)-ol-20-one acetate; and CLII, rearrangement of 16,17-dibromopregnan-3(β)-ol-20-one.

The sterols of alfalfa seed oil.—II, Isolation of β-spinasterol and δ-spinasterol, L. C. King and C. D. Ball. (Mich. State Col.). (*Jour. Amer. Chem.* Soc., *64 (1942), No. 10, pp. 2488–2492*).—From the unsaponifiable portion of Hardigan alfalfa seed oil, the authors isolated three isomeric sterols of formula $C_{29}H_{48}O \cdot \frac{1}{2}H_2O$, namely, α-spinasterol, β-spinasterol, and a new sterol designated δ-spinasterol. Several derivatives of each of the sterols were prepared and the physical constants and analysis were observed. Each of the three isomeric sterols could be reduced to α-stigmastenol.

Some mono- and di-alkyl ethers of stilboestrol, E. E. Reid and E. Wilson (*Jour. Amer. Chem. Soc., 64 (1942), No. 7, pp. 1625–1626, illus. 1*).—The normal mono- and di-alkyl ethers of stilboestrol from methyl to octadecyl were prepared, and their estrogenic activities were determined.

Physico-chemical characteristics of the interstitial cell stimulating hormone from sheep pituitary glands, C. H. Li, M. E. Simpson, and H. M. Evans. (Univ. Calif. et al.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 2, pp. 367–369, illus. 2*).—A modification of the method for isolation of sheep interstitial cell stimulating hormones is described. The preparation behaved as a single substance in electrophoresis and in ultracentrifuge and solubility studies. The isoelectric point of the sheep ICSH was shown to be pH 4.6. The molecular weight was determined to be 40,000, both from osmotic pressure studies and analytical data. A comparison between sheep and pig ICSH was made. Biological properties of this hormone have previously been noted (E. S. R., 88, p. 39).

Absorption of oxygen by glutathione in alkaline solutions.—I, Kinetics of the reaction at pH 9 to 11, M. B. and H. A. Young. (Univ. Calif.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 10, pp. 2282–2287, illus. 9*).—The rate of absorption of oxygen by glutathione in the pH range from 9 to 11 and in the presence of copper sulfate catalyst was measured. The effect of changes in copper sulfate and glutathione concentrations and oxygen pressure are presented. A rate law and partial mechanism are proposed.

The hydration of β-lactoglobulin crystals, T. L. McMeekin and R. C. Warner (U. S. D. A.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 10, pp. 2393–2398, illus. 1*).—β-Lactoglobulin crystals were found to contain 0.83 gm. of water for each gram of anhydrous protein over a wide range of temperature in the absence of salt or in the presence of high concentrations of ammonium sulfate. Ammonium sulfate was found to diffuse rapidly into the β-lactoglobulin crystal, but the concentration of ammonium sulfate on the inside of the crystal reached only 82.3 percent of the salt concentration in the surrounding liquid. The density of wet β-lactoglobulin crystals, measured in organic liquids, was found to be 1.146, a value consistent with the high water content of the crystal. Values for the density of β-lactoglobulin crystals under various conditions are reported. It is shown that the method of measuring the density of wet crystals in aqueous media is subject to large errors.

The oxidation of β-pinene with selenium dioxide, L. M. Joshel and S. Palkin. (U. S. D. A.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 4, pp. 1008–1009*).—When somewhat less than one-half a mole of selenium dioxide is used per mole of β-pinene, pinocarveol is readily obtained. The yield was about 42 percent.

Formation of conjugated material during bleaching of vegetable oils, J. H. Mitchell, Jr., and H. R. Kraybill. (Ind. Expt. Sta.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 4, pp. 988–994, illus. 5*) —Alkali refining of vegetable oils as well as refining by adsorption with a special silicate adsorbent led to a decrease of absorption in the ultraviolet region, a result thought to be due to removal of some of the nonfat constituents. Bleaching with fuller's earth caused the development of definite absorption bands. Oils containing only linoleic acid developed bands at 2,680 a. u., while oils containing both linoleic and linolenic acids developed bands at 2,680, 3,000, and 3.160 a. u. The band at 2,680 a. u. was found due to a triene conjugated system which is formed from linoleic and linolenic acids and the bands at 3,000 and 3,160 a. u., to a tetraene conjugated system formed from linolenic acid. By low temperature crystallization from solvents, the most unsaturated fraction of bleached linseed oil fatty acids was obtained. This process removed the substance causing a band at 2,680 a. u., leaving the highly unsaturated fraction with a spectrum similar to that of the four double bond conjugated system in decatetraene and in parinaric acid. There was no evidence for diene conjugation in linoleic and linolenic acids prepared by debromination. In the bleached oils examined, the conjugated material amounted to about 0.1 or 0.2 percent.

Hydrogen in the metabolism of Azotobacter, J. B. and P. W. Wilson. (Univ. Wis.). (*Jour. Bact., 44 (1942), No. 2, pp. 250–251*).—*A. agile* and *A. chroococcum* were found apparently to possess a hydrogenase activity similar to that of *A. vinelandii*. This was indicated in experiments to determine the total gas uptake per hour per milligram N in 96 percent H_2, 4 percent O_2, and determinations of uptake of O_2 in 96 percent He, 4 percent O_2. Preliminary experiments indicated that suspensions of *A. vinelandii* about 5 to 10 times as heavy as those used for determining respiration or hydrogenase activity induce an anaerobic production of acid and gas which is probably hydrogen from added carbohydrate.

The isolation and absorption spectrum maxima of bacterial carotenoid pigments, B. SOBIN and G. L. STAHLY. (Ohio State Univ.). (*Jour. Bact., 44 (1942), No. 3, pp. 265–276*).—The pigments were extracted from 14 different species of bacterial cells with hot methanol. They were separated by chromatographic adsorption and then subjected to spectrometric analysis. Twelve carotenoid pigments were isolated. The species included 5 Flavobacteria, 3 Sarcinae, 2 Micrococci, 2 Erwiniae, 1 *Bacterium*, and 1 *Cellumonas*. Of these carotenoids, 7 were alcohols and 5 were hydrocarbons. Some bacteria produced only one pigment; others, several. *Flavobacterium arborescens* contained 5 distinct hydrocarbon carotenoids. Some species separable by fermentation reactions produced identical pigment. Of *Staphylococcus aureus* 12 strains, obtained from various sources, were subjected to pigment analysis. Pigments of which the absorption maxima were identical with those of δ-carotene and rubixanthin were found in all the strains studied. The strain used as a test organism for determining phenol coefficients also contained another hydrocarbon. Four strains isolated from food-poisoning cases and 4 from staphylococcic infections also contained an ester of a carotenol with absorption maxima the same as those of rubixanthin.

It is pointed out that bacteria offer interesting possibilities for discovering the function of the carotenoid pigments in nature.

Growth stimulating substances for Lactobacillus casei, R. E. FEENEY and F. M. STRONG. (Wis. Expt. Sta.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 4, pp. 881–884, illus. 2*).—Asparagine, glutamine, glutamic acid, adenine, and guanine were shown to stimulate the growth of *L. casei* under certain cultural conditions. Glutamine was stimulatory at very low concentrations. Under certain conditions aspartic acid, asparagine, adenine, and guanine were inhibitory. The inhibition caused by aspartic acid was counteracted by either asparagine, glutamine, or glutamic acid. The relation of these substances to the microbiological assay of pantothenic acid and riboflavin was investigated.

The sanitary significance of pectin-fermenting, lactose-fermenting, gram-negative, non-spore-forming bacteria in water, D. B. MCFADDEN, R. H. WEAVER, and M. SCHERAGO. (Univ. Ky.) (*Jour. Bact., 44 (1942), No. 2, pp. 191–199*).—Four pectin-fermenting strains, all of them isolated from water, possessed typical *Escherichia coli* characteristics; 28 strains, from mule and dog feces and from water, possessed typical *Aerobacter aerogenes* characteristics; and 32 strains, from cow feces and from water, possessed characteristics of intermediate coliform organisms. Because of lack of information concerning the reactions of members of the genus *Erwinia* and of nonpigmented strains of *Serratia* on the media which are used for studying coliform organisms, it was not determined if any of the pectin-fermenting organisms isolated belong to either of these genera. It is concluded that since relatively more pectin-fermenting coliform organisms are found in water than in the feces of animals, some of them, at least, are probably not of fecal origin.

The concentration and purification of tobacco mosaic virus by means of the Sharples super-centrifuge, W. M. STANLEY (*Jour. Amer. Chem. Soc., 64 (1942), No. 8, pp. 1804–1806*).—The concentration and purification of tobacco mosaic virus were efficiently accomplished by means of a regular clarifier bowl operated at a speed of 50,000 r. p. m. by compressed air. It was found advantageous to use a cooling coil, a celluloid and a filter paper liner in the bowl, and a modified delivery jet constructed from a small hypodermic needle. By using the clarified juice from mosaic-diseased Turkish tobacco plants as starting material, it was possible to prepare from 10 to 15 gm. of tobacco mosaic virus, sufficiently pure for most purposes, during the course of 10 hr.

Basic amino acids in strains of tobacco mosaic virus, C. A. Knight (*Jour. Amer. Chem. Soc., 64 (1942), No. 12 pp. 2734–2736*).—Analyses of seven different preparations of tobacco mosaic virus by two methods indicated that this virus contains 9.2±0.1 percent of arginine. A similar percentage of arginine was found in the Holmes masked, Holmes ribgrass, and J14D1 strains. The green and yellow aucuba strains were found to contain 10.0 percent of arginine and the cucumber viruses 3 and 4, 8.7 percent of arginine. No histidine could be detected in seven of eight strains, but about 0.55 percent of histidine was found in the ribgrass strain. Indirect analyses indicated that the eight strains contain a small percentage of lysine, but this finding has not yet been verified by isolation methods.

Note on invertase activity in identical mixtures in the liquid and frozen state, Z. I. Kertesz. (N. Y. State Expt. Sta.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 11, pp. 2577–2578*).—If reaction mixtures containing sucrose, invertase, and buffer in water solution are quickly cooled, temperatures as low as —9° [C.] may be reached without freezing the mixture. Shaking of the tubes during cooling (or sometimes even moving them) is sufficient, however, to cause a rapid solidification of the mixture. Single observations in liquid and frozen mixtures were performed at various temperatures between —2° and —8°. The measurement of the two whole sets of determinations was most successful at —6.8°. The velocity of invertase action in a frozen mixture at —6.8° was only 27 percent of that in a like mixture in the liquid state. The diminished availability of water may be responsible for this phenomenon.

Ionic competition in base-exchange reactions, R. H. Bray. (Ill. Expt. Sta.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 4, pp. 954–963, illus. 4*).—The immediate equilibria between mixtures of exchangeable cations as they occur naturally in clays and small quantities of an added cation were studied. Cation-exchange equations from the data obtained which enable calculation of the release (or adsorption) of an individual cation in the presence of one or more complementary cations on the colloid when one or more cations are added as highly ionized electrolytes were developed.

The relative ease of release for univalent and bivalent exchangeable cations is shown to be in the order NA>K>Mg>Ca>H. The exchangeable bases as usually determined by leaching with a neutral salt solution are shown to be those which are in equilibrium with added electrolytes after a short shaking period and are defined as readily exchangeable bases. The secondary effect of the aluminum of the silicate lattice on the pH of the supernatant solution in acid clay studies is discussed in relation to the application of base-exchange equations.

The composition and palatability of some common grasses, J. G. Archibald, E. Bennett, and W. S. Ritchie. (Mass. Expt. Sta.). (*Jour. Agr. Res. [U. S.], 66 (1943), No. 9, pp. 341–347*).—This is the final report of a 7-yr. investigation (E. S. R., 73, p. 825) into the chemical composition and palatability to cows of certain grasses and legumes grown as practically pure stands. The species studied were Kentucky bluegrass, orchard grass, redtop, Rhode Island bent, sheep fescue, timothy, sweet vernal grass, white Dutch clover, and Ladino clover. Of these, 300 samples, reduced by compositing to 263, were analyzed; 51 biological assays were made for vitamin A; and palatability tests with 5 cows, extending over 105 hr. of potential grazing time and 54 hr. of actual grazing time, were carried out. Considerable species differences were noted in the several constituents except nitrogen and phosphorus. These differences for the most part were more obvious between the two groups of grasses (top and bottom) than between the individuals within a group. Relatively the greatest group differences were in vitamin A (carotene), magnesium, soluble ash, and ether extract, probably because of greater leaf area in the top grasses. The composition of the two legumes was in rather sharp contrast to that of the grasses. Highly significant correlations between certain of the constituents were noted. Cows used in palatability tests showed a definite preference for species high in moisture and carotene and low in fiber. The nitrogen (protein) content of the grasses apparently had little, if any, relation to their palatability.

Composition of Kentucky bluegrass cut at different times during the year, G. D. BUCKNER, A. HARMS, and W. M. INSKO, JR. (*Kentucky Sta. Bul. 440 (1942), pp. 10, illus. 1*).—Grass cut at 7-day intervals from successive plats for 36 mo., 1936–39, was analyzed, the components determined being crude protein, ether extract, crude fiber, nitrogen-free extract, crude ash, silica, calcium, and phosphorus. The grass contained the most protein in September, October, and November, the least in June and July. The average percentage of calcium ranged from 0.4 in July to 0.7 in November in 1936–37. The percentage of phosphorus ranged from 0.2 in July, August, and September to 0.5 in April in the same year. The ratio of percentage of calcium to percentage of phosphorus ranged from 1.2 in April to 3.0 in September and was sensibly uniform from January to May, inclusive, at about 1.25.

[Field analysis of maple sap and testing of young trees], C. L. STEVENS and S. DUNN (*New Hampshire Sta. Bul. 345 (1942), pp. 40–41*).—It was found that the refractometer can be carried into the woods and used beside the trees, provided it can be held in direct sunlight. It is not necessary that the trees be tapped for the test, as clipped twigs yield enough sap in 1 or 2 min. Small trees were successfully tested in this manner.

The proteins of various tree seeds, A. P. LUND and W. M. SANDSTROM. (Minn. Expt. Sta.). (*Jour. Agr. Res.* [*U. S.*], *66 (1943), No. 9, pp. 349–355*).—Seeds of the elm (*Ulmus americana*); ironwood (*Ostrya virginiana*); three species of black oaks—northern red (*Quercus borealis*), red (*Q. borealis maxima*), and northern pin oak (*Q. ellipsoidalis*); and two species of white oaks—*Q. alba* and the northern bur oak (*Q. macrocarpa oliracformis*)—were studied. Elm and ironwood seeds are rich in fats; the black (red) oaks have approximately the same fat content, which is several times that of the white oaks. The seed meals were extracted in turn with solvents to peptize albumins, globulins, prolamins, and glutelins. The major proteins were isolated and analyzed by the Van Slyke procedure for nitrogen distribution. These include the albumins, globulins, and glutelins from both the elm and the ironwood and only the glutelins from each of the oaks. These proteins were found essentially similar to those of other seeds.

The chemistry of allergens.—VI, Chemical composition and properties of an active carbohydrate-free protein from cottonseed, J. R. SPIES and E. J. UMBERGER. (U. S. D. A. et al.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 8, pp. 1889–1891, illus. 3*).—Extending their previous work in this field,[2] the authors isolated a carbohydrate-free allergenic protein, CS–60C, from previously described protein-polysaccharidic fractions from cottonseed. Its chemical composition, optical rotation, and ultraviolet absorption curve were determined. Solubility data indicated that CS–60C was not homogeneous but probably represented a mixture of active proteins whose structural variations were too slight to permit effective chemical separation. Fraction CS–60C was antigenic as shown by tests on guinea pigs. Positive passive transfer reactions were produced with 1×10^{-9} gm. of CS–COC.

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[2] Jour. Amer. Chem. Soc., 63 (1941), No. 11, pp. 2994–2996.

Structure of the dextrins isolated from corn sirup, M. Levine, J. F. Foster, and R. M. Hixon. (Iowa Expt. Sta.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 10, pp. 2331–2337, illus. 4*).—A method for isolating the dextrins from corn sirup in large quantities is detailed. Repeated alcohol fractionation gave fractions ranging in mean molecular weight from less than 2 glucose units to 26 units. The higher fractions are believed to have been relatively free of maltose and glucose.

Oxidation of the dextrins to the potassium salts of the dextrinic acids gave good yields and the potassium content of the products agreed with the reducing value of the original dextrin, indicating the iodine reaction to be quantitative and a true measure of molecular size. The specific rotations of the dextrins also agreed with the values calculated from iodine molecular weights. Tetramethyl glucose assay of the methylated dextrins indicated the chains to be essentially unbranched and nonreducing fractions to be absent. Almost complete absence of dimethyl glucose was established, together with agreement of the rotations with the calculated values.

The reaction of phenylhydrazine with the smaller starch dextrins was found to be quantitative, but the derivatives were unstable and appeared to be largely of the phenylhydrazide type. The dextrin fractions averaging greater than about 6 glucose units in length show a strong tendency to adsorb phenylhydrazine. A possible explanation is given.

A new fructosan isolated from Yucca mohavensis, Sarg., K. P. Dimick and B. E. Christensen. (Oreg. State Col.). (*Jour. Amer. Chem. Soc. 64 (1942), No. 10, pp. 2501–2502*).—The authors find that fructosan exists in considerable quantities in the stem of *Y. mohavensis.* It is very readily hydrolyzed and may be a fructofuranose. The compound appears to be similar to the graminin isolated from rye flour. Although first obtained from the 70-percent alcohol extract, this fructosan was also isolated from the hot aqueous extract of the ground and dried stem.

Isolation of lupeol from the Osage orange (Maclura pomifera Raf.), L. J. Swift and E. D. Walter. (Ind. Expt. Sta.) (*Jour. Amer. Chem. Soc., 64 (1942) No. 11, pp. 2539–2540, illus. 1*).—Lupeol was isolated from the Osage orange. It appeared to be a constituent of the latex. Some crystallographic optical properties of lupeol, lupeol acetate, and lupeol benzoate are recorded.

Oxidation and reduction of vitamin C, D. B. Hand and E. C. Greisen. (Cornell Univ.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 2, pp. 358–361, illus. 2*).—The amount of oxygen used in the oxidation of vitamin C depends on the nature of the catalyst: With cucumber oxidase 1.0, with copper from 1.19 to 1.67, and with riboflavin in the light from 1.57 to 2 atoms of oxygen are involved. The oxidation is completely reversible with 1.0 but only partially reversible with more than 1.0 atom of oxygen. The partial irreversibility is due to the production of hydrogen peroxide. Two molecules of hydrozen peroxide oxidize 1 molecule of ascorbic acid.

Action of intestinal microörganisms on ascorbic acid, R. M. Young and L. H. James. (Univ. Md.). (*Jour. Bact., 44 (1942), No. 1, pp. 75–84, illus. 3*).—Several direct human fecal cultures and isolated cultures of *Escherichia coli* and *Aerobacter aerogenes* were found to decompose vitamin C under both aerobic and anaerobic conditions. Organisms of the *Proteus* and *Alcaligenes* groups failed to attack the vitamin and definitely protected the substance from atmospheric oxidation, but the protective action was not operative in the presence of vitamin C-decomposing bacteria. The presence of glucose or lactose in ascorbic acid nutrient medium definitely protected the vitamin from oxidation by the fecal cultures and pure cultures of *E. coli*. The antioxidant action was operative under aerobic and anaerobic conditions. The vitamin disappeared rapidly from the medium as soon as the sugar had been completely utilized.

7-Dehydrocampesterol, a new provitamin D, W. L. Ruigh (*Jour. Amer. Chem. Soc., 64 (1942), No. 8, pp. 1900–1902*).—The preparation and properties of 7-dehydrocampesterol are described. On irradiation with ultraviolet light, this compound yielded an antirachitically active product. By comparison with ergosterol irradiated under the same conditions, the antirachitic potency of the vitamin derived from 7-dehydrocampesterol was estimated as 4,100,000 International Units per gram.

Microbiological investigations on the dew-retting of flax, H. L. Jensen (*Linn. Soc. N. S. Wales, Proc., 66 (1941), pt. 5–6, pp. 276–286, illus. 3*).—Dew retting of flax in Australia appears to be due entirely to fungi, and laboratory studies indicated that the most important ones at 10°–12° are *Mucor racemosus* (?) and *Cladosporium herbarum;* at 24°–30° *Rhizopus nigricans*, *C. herbarum*, *Alternaria* spp., and *Stachybotrys* sp.; and at 37° *R. nigricans* and *Aspergillus* spp. In the field, the predominant forms were *C. herbarum*, *Dematium pullulans*, and *Alternaria* spp. A more varied flora arose on overretted straw. The absence of Mucoraceae, especially *R. nigricans*, seemed due at least in part to inhibition by sunlight. The bacteria found on dew-retted flax (*Bacterium herbicola*, *Bacillus mesentericus*, etc.) were found unable to produce retting. A few yeasts possessed the ability but seemed unlikely to be active under field conditions. All the fungi tested could ret flax straw more or less quickly, and some of them, especially *Stachybotrys* sp., caused rapid destruction of the fiber; this effect was less pronounced in *Mucor*, *Rhizopus*, and *Cladosporium* and was not particularly strong in the species found on overretted straw; their occurrence seems therefore to be the result rather than the cause of overretting. Fibers of the same dark color as naturally dew-retted flax were produced by *Cladosporium*, *Dematium*, *Alternaria*, and other fungi that form dark pigments. The finest fiber appeared to be produced by *Mucor*, *Rhizopus*, and the Aspergilli. Dew-retting was accompanied by a loss of acidity, the reaction changing from pH 5.3–5.7 in unretted to pH 6.8–7.4 in fully retted straw.

New caustic peeling method reduces waste, saves labor, L. C. Mazzola (*Food Indus., 15 (1943), No. 1, pp. 53–54, 104, illus. 4*).—The new lye peeling method described in this article was developed for peeling potatoes, although the principle has application to other root vegetables and to some fruits. It utilizes a hot concentrated lye solution, tests having indicated that a concentration above 20 percent so reduces the time factor that peeling losses due to partial cooking of the potato are greatly reduced. Trials using an efficient mechanical digester for the lye treatment, followed by washing and by decortication in a tumbler under a spray, showed that waste could be as low as 3 percent with new potatoes and never higher than 12 percent for old U. S. No. 1 potatoes, the average being about 8 percent. This effected a saving of at least 17 percent as compared with waste percentages attained with abrasive peelers. For the practical commercial application of this discovery, the provisions to be met by a good production line are described.

The chemistry and technology of the soybean and its derived products, I, II, K. S. Markley and W. H. Goss (*U. S. Dept. Agr., Bur. Agr. Chem. and Engin., 1942, ACE–142, pts. 1, pp. 112+, illus. 4; 2, pp. 69+, illus. 28*).—Part 1, chemical composition and properties of constituents and derived products, by

Markley, presents in the introduction an outline of the known history of soybean production and utilization, together with the following further contents: Composition and properties, mineral constituents, proteins and other nitrogenous constituents, enzymes, carbohydrates, glycosides, pigments, vitamins, and oil and oil-soluble constituents. Part 1 contains also a bibliography of nearly 500 references.

Part 2, on the processing of soybeans and soybean products, by Goss, contains sections on processing soybeans, production and refining of phosphatides, and processing soybean oil for food uses, and has a bibliography of more than 200 references.

Wheat, its products and uses (*U. S. Dept. Agr., Bur. Agr. Chem. and Engin., 1942, ACE–189, pp. 58+, illus. 3*).—This is a general review, prepared by the Northern Regional Research Laboratory, of the following principal contents: Origin; botanical description; structure and composition; vitamin content; production development; commercial types; production areas and variety distribution; harvesting dates and methods; relative importance of the wheat crop; grades and prices; production, supply, and distribution; uses; flour milling processes; wheat utilization research; and selected references.

Corncobs—their composition, uses, and availability (*U. S. Dept. Agr., Bur. Agr. Chem. and Engin., 1943, ACE–190, pp. 28+, illus. 4*).—This compilation, prepared by the Northern Regional Research Laboratory, gives information on the present and potential value in war products or commercial utilization of corncobs and their derived materials. The contents are as follows: Introduction, structural and physical characteristics, chemical composition, fuel or B. t. u. value, nutritive value, proportionate weight of cobs in ear corn, supply, availability, cost, uses for cobs, selected references, and literature cited.

New uses for low-grade tobacco, J. S. McHargue, C. W. Woodmansee, and K. E. Rapp (*Kentucky Sta. Bul. 439 (1942), pp. 12, illus. 1*).—This is a progress report. Determinations of chlorophyll, furfural, sugars, nitrogen, potassium, nicotine, crude fiber, and organic acids were made. Extracts obtained by certain solvents also were studied on both a laboratory and a pilot-plant scale.

"Products made from low-grade Kentucky tobacco in this investigation, and offering most promise of being suitable for commercial development, were soap made from tobacco fat, stains and wax from the extracts of tobacco, nicotine, low-nicotine tobacco leaf for blending in smoking tobaccos, fiberboard, and tobacco-seed oil. All these products, and the processes used in obtaining them, would of course need to be considerably refined before conversion from a laboratory scale to a commercial scale of manufacture."

Cytology and cell physiology, edited by G. Bourne (*London and New (Stain Technol., 17 (1942), No. 4, pp. 171–175, illus. 6*).—Root tips of *Crepis* of the work here noted are indicated by the statement in the foreword by R. A. Peters that "this book is wanted to form a permanent record of the tendency for these two previously separated groups of workers [the morphologic cytologists and the biochemists] to draw together." The contents consist of condensed monographs as follows: Some Aspects of Cytological Technique, by J. R. Baker; Physical and Physicochemical Studies of Cells—Part I, General, by J. F. Danielli, Part II, Monolayer Technique, by J. H. Schulman; The Cell Surface and Cell Physiology, by J. F. Danielli; Mitochondria and Golgi Apparatus, by G. Bourne; Nucleus, Chromosomes, and Genes, by M. J. D. White; Micro-Incineration and the Inorganic Constituents of Cells, by E. S. Horning; Enzyme Systems of Cells, by H. Blaschko and W. Jacobson; and Pathological Aspects of Cytology, by R. J. Ludford.

Cytological methods for Crepis species, H. A. Tobgy. (Univ. Calif.). (*Stain Technol., 17 (1942), No. 4, pp. 171–175, illus. 6*).—Root tips of *Crepis* sp. are fixed in La Cour's "2BE" and dehydrated through a butyl alcohol series, stained in 1 percent crystal violet for 1 hr., with chromic acid and iodine as pre- and post-staining mordants, respectively, and passed through dehydrating alcohols containing picric acid and ammonium hydroxide. Differentiation is done in clove oil. The method is rapid, the chromosomes are dark purple, the centromere is not stained, and the cytoplasm is clear. By further controlled destaining, the heterochromatic segments within the chromosomes may be located. Pollen mother cells are fixed in acetic alcohol (1:4) and squashed in acetocarmine. A method for making semipermanent preparations mounted in diaphane is described. Pollen grains are mounted in lactophenol with acid fuchsin or aniline blue W. S. as the dye.

Colchicine-Feulgen leaf smears, J. R. Meyer (*Stain Technol., 18 (1943), No. 2, pp. 53–56, illus. 1*).—As advantages for chromosome study of a pretreatment of young leaves with dilute colchicine solutions before fixation, the author points out that it prevents spindle formation, allows the chromosomes to be widely spread in the cell, straightens the chromatids, allows the constrictions to become very noticeable, increases the number of chromosome plates by preventing anaphase, facilitates smearing, and stains only the chromosomes. Young leaves are generally easily obtainable, while roots of the proper sort are to be had only under very special conditions. Mitoses are frequently more numerous in young leaves than in roots.

A schedule for *Phlox* sp. involves a 1- to 2-hr. pretreatment of young leaves in a 0.2-percent colchicine solution, fixation in Semmen's Carnoy (3 volumes absolute alcohol, 1 volume glacial acetic, and 1 volume chloroform), hydrolysis for 25 min. in 10 percent HCl at 58° C., staining in decolorized fuchsin, smearing in 45 percent acetic acid, and running the material on slide and cover glass through acetic alcohols (1:1, 1:3, 1:9), absolute alcohol, xylol, and balsam.

Differentiating abnormal cells in Valencia orange vesicles, F. M. Turrell and E. T. Bartholomew. (Calif. Citrus Expt. Sta.). (*Stain Technol., 18 (1943), No. 2, pp. 73–75, illus. 2*).—Metamorphosing cells developing thick cell walls in the juice vesicle of granulated Valencia oranges, which cannot be detected by ordinary microscopical examination, may be differentiated in an early stage for microchemical analysis in lignification studies. Thick sections of the juice vesicle are treated overnight in a 1:10,000 aqueous solution of ruthenium red, followed by 5–10 min. in a 1:5,000 aqueous solution of methylene blue, and then differentiated in water.

A flagella staining technic for soil bacteria, P. J. Fisher and J. E. Conn. (N. Y. State Expt. Sta.). (*Stain Technol., 17 (1942), No. 3, pp. 117–121, illus. 5*).—Dichromate cleaned slides, preferably new, are rinsed in distilled water and kept in 95 percent alcohol. From the alcohol, heat the slides by passing back and forth through a flame until a yellow color appears in the flame. Gradually lift slide above the hottest part of the flame and then place, flamed side up, on a metal plate heated just hot enough to produce steam from water. Allow the plate to cool gradually in order to reanneal the slide. Use young actively growing cultures on agar slants. Check the culture for motility by the hanging drop method. Wash off the growth by gentle agitation with from 2 to 3 cc. of sterile distilled water. Transfer the suspension to a sterile test tube and incubate at optimum temperature for 10 min. (30 min. for those producing slime). Again observe for motility. Transfer a small drop of the culture from the top of the suspension by means of a Pasteur pipette to one end of the previously cleaned and cooled slide. Gently tilt the slide and allow the drop to run slowly to the other end. Place the slide in a tilted position and allow to dry in the air. Mordanting requires two solutions, prepared fresh each time: Solution I—tannic acid, 10 percent aqueous, 18 cc., and ferric chloride, 6 percent aqueous, 6 cc.; and solution II—solution I 3.5 cc., basic fuchsin, 5 percent alcoholic, 0.5 cc., HCl, concentrated, 0.5 cc., and formalin, 2.0 cc. Pour solution I onto the slide through a filter and allow it to remain for 3.5 min. Pour off without washing and add solution II in the same way. After 7 min., wash the slide with distilled water. Before the slide dries, cover with Ziehl-Neelsen carbol fuchsin and allow it to stand for 1 min. on a hot plate heated just enough to steam. Wash and dry the slide in the air.

Photomicrographs×900 show successful preparations of an unidentified species of *Pseudomonas*, *P. fluorescens*, *Alcaligenes fecalis*, *Escherichia coli*, and *Azotobacter vinelandii*.

The staining of the metachromatic granules in Corynebacterium diphtheriae, H. E. Morton and A. Francisco (*Stain Technol., 17 (1942), No. 1, pp. 27–29*).—The staining solutions most effective for this purpose were uniformly those of the lower pH values. Albert's and Mallory's stains (pH 2.8 and 2.82, respectively) were very good. Neisser's stain (solution I, pH 2.82, and solution II, pH 3.2) was the best stain found for the granules. Ponder's stain (pH 3.22) also gave good results. Beck's stain (solutions I and II, pH 3.05 and 3.55, respectively) was not quite so good as the Neisser stain. Loeffler's alakine methylene blue (pH 8.3) was the least effective for demonstrating the granules.

The use of darkfield illumination for the study of stained blood films, P. H. Ralph (*Stain Technol., 17 (1942), No. 1, pp. 7–10, illus. 2*).—The author was able to avoid the difficulties ordinarily met in the use of the dark field for blood films by the use of a bispheric dark-field condenser, 6-v., 108-w. bulb with a focusing lamp condenser, and a fluorite objective of N. A. 1.3, ×97, with ×10 eyepieces. Color appearances of the megakaryocyte under both bright and dark-field illumination are described.

On the structure and staining of starch grains of the potato tuber, J. C. Bates. (Kans. State Col.). (*Stain Technol., 17 (1942), No. 2, pp. 49–56, illus. 20*).—Staining with hematoxylin is preceded by the swelling action of formaldehyde. In staining with safranine O and fast green FCF, the formaldehyde is added to the staining solution. The results obtained are as follows:

(1) A clavate central structure composed of small particles arranged in definite layers is revealed within the grain; (2) differential staining of the locus of the grain and the lamellae alternating with it in a small region around the longitudinal axis of the grain; (3) the simultaneous staining and separation of the grain into a cone-shaped peripheral portion and a spherical body containing the locus of the grain which emerges from it; and (4) differential staining of a ring or layer of substance around a spherical refractive body within the grain.

A rapid determination of concentration in liquid-in-liquid solutions, L. K. Mann and H. L. Jeter (*Stain Technol., 17 (1942), No. 1, pp. 25–26*).—A drop of the solution of unknown concentration is placed on the surface of a film of a known concentration of the same solute of a slide. If of a surface tension higher than that of the film, the drop remains convex for several seconds; if of a surface tension lower than that of the film, the drop spreads rapidly, with disturbance of the surface. In the experiments with water-alcohol mixtures, differences of 2 percent in the concentration could be detected, the water having a surface tension much higher than that of the alcohol.

Paraffin compression due to the rotary microtome, W. T. Dempster (*Stain Technol., 18 (1943), No. 1, pp. 13–24, illus. 3*).—The extent of microtome section compression was investigated both in blocks containing embedded tissues and in blocks of paraffin alone. Thick sections are commonly compressed 15 percent or more, while in sections below 5μ or 10μ, compression may exceed 50 percent. Compensatory thickening of sections occurs. The degree of compression for various paraffin samples and for various conditions of knife edge, temperature, etc., is compared. Microscopical work, particularly where quantitative data or reconstructions are involved, is often seriously impaired by unrecognized artifacts of sectioning. Compensation for distortions of sections is not easy because tissues, particularly dense tissues, may compress less than the paraffin matrix. Section corrugation is due to this inequality in compression. Absorption of water in section flattening causes some tissue readjustment, but this varies with different tissues and different fixations.

Technic for photographing early cleavage stages of the hen's egg, M. W. Olsen. (Univ. Md.). (*Stain Technol., 17 (1942), No. 2, pp. 69–71, illus. 2*).—The whole yolk is fixed in Bouin's solution during 24 to 48 hr., after which it is placed in 60 percent alcohol, the vitelline membrane is removed, and the blastodisk is dissected out and placed in the cell of a depression slide. Two or three drops of gentian violet in 95 percent alcohol are then applied to the upper surface of the blastodisk. The tissue is then destained by the application of several changes of 60 percent alcohol. If the destaining process is done carefully, a point can be reached where the stain will be completely removed from the upper surface of the cells, leaving only a small amount of stain in the cleavage furrows. This creates a marked contrast between the cells and the cleavage furrows so that they can be easily photographed.

Two convenient washing devices for tissues and slides, G. H. Mickey and H. Tlas. (La. State Univ.). (*Stain Technol., 17 (1942), No. 2, pp. 65–68, illus. 4*).—For the washing of fixed tissues a row of tubes open at the top and closed at the bottom by cheesecloth or bolting cloth is supported by spring collars. The metal tube running over the tops of the tubes has a number of small perforations over each tube. The assembly is so placed in an aluminum baking pan to which the supporting frame is riveted that the bottoms of the tubes are under the surface of the collected water in the pan. For washing slides, water is made to enter a similar baking pan near the bottom, passing upward between the slides held in metal staining racks and escaping over the edge of the pan. Drawings show constructional detail of the tissue washing set-up.

A staining rack for handling cover-glass preparations, T.-T. Chen. (Univ. Calif.). (*Stain Technol., 17 (1942), No. 3, pp. 129–130, illus. 1*).—The author describes a rack for 12 covers, preferably 22-mm. circles, the device being made from porcelain, and its design and reduction in dimensions of the racks commonly used for slides. The new rack is made and sold by an apparatus supply house.

Notes on mounting media, J. L. Mohr and W. Wehrle. (Univ. Calif.). (*Stain Technol., 17 (1942), No. 4, pp. 157–160*).—A method of compounding a mounting medium from camphor, salol, sandarac resin, eucalyptol, dioxane, and paraldehyde is described. This medium is to be very slightly colored by the addition of a trace of copper oleate in the form of a 10 percent solution in eucalyptol. The use of the synthetic resin clarite is also discussed. The formation of air bays in thick amounts may be prevented by plasticizing with dibutyl phthalate, but this addition causes slow solidification of the medium.

Simplified method for the preparation of silica gels, A. J. Sterges. (Tex. Expt. Sta.) (*Jour. Bact., 44 (1942), No. 1, p. 138*).—The author describes the preparation of a nutrient medium gelatinized by colloidal silica compounded in a manner such that the mixture remains liquid for about 8 min., permitting its convenient transfer to tubes or plates before setting.

AGRICULTURAL METEOROLOGY

Evaporation-loss per month over drainage areas, II, III, D. Lloyd (*Roy. Met. Soc. [London], Quart. Jour., 67 (1941), No. 288, pp. 33–38, illus. 4; 68 (1942), No. 293, pp. 35–43, illus. 5*).

II. *Loss over three areas.*—The data from three more drainage areas were examined by the same method as in the preceding paper (E. S. R., 84, p. 154), the results again showing that the variations in loss can be largely associated with variations in rainfall and temperature. It was also indicated that with similar climatic conditions the loss increases as the subsurface has increasing permeability.

III. *Curvilinearity in relationship to rainfall of the same month and influence of previous rainfall.*—Evidence is presented (and diagrammatically illustrated) for curvilinearity in the partial relation between evaporation loss and the period rainfall, and the joint functional causation of rainfall and temperature is further advanced. It is inferred statistically that rain experienced in three previous months augments runoff and influences the value of apparent loss to a small extent (amounts stated), but not sufficiently to alter the relations of evaporation loss previously referred to in the two preceding papers of the series.

Gustiness under various weather conditions, S. P. Fergusson (*Amer. Met. Soc. Bul., 24 (1943), No. 1, pp. 22–29, illus. 7*).—Records of rapid variations of wind velocity, usually obtained during gales, are important in studies of the destructive effects of high winds, and from such data the relation of variations of high frequency to high mean velocities during long periods of time has been determined with fair accuracy. Gales, however, accompany but one or two kinds of condition, and a desirable supplementary comparison of gustiness with other phenomena of the atmosphere—storms, cloudiness, diurnal changes of pressure and temperature, etc.—has been undertaken at Blue Hill Observatory under the very favorable circumstances prevailing there. The records thus far obtained (methods described) confirm earlier data on the connection between variable velocities and the more conspicuous changes of condition of the atmosphere, the range of velocity and frequency of gusts being higher on days with strong convection than during other periods when the sky is overcast and the vertical component of the wind is small.

The determination of the location and frequency of thunderstorms by a radio method, J. S. Forrest (*Roy. Met. Soc. [London], Quart. Jour., 69 (1943), No. 298, pp. 33–44, illus. 9*).—The apparatus described for continuously recording atmospherics to obtain warning of the outbreak of a thunderstorm and to determine the distance from the recording site consists essentially of a radio receiver tuned to about 150 kc./sec. and connected to a continuous chart-output-recording meter. A modulated oscillator is incorporated in order to maintain constant the characteristics of the receiver.

Nuevo método de clasificación climática, W. Knoche (*Rev. Argentina Agron., 10 (1943), No. 1, pp. 20–34, illus. 8*).

Estudios climatológicos: Areas geográficas de dispersión, Parthenium argentatum, Hevea brasiliensis, Castilloa elastica [Climatological studies: Geographic areas of distribution for guayule and for Pará and castilla rubbertrees], A. Contreras Arias (*México Sec. Agr. y Fomento, 1942, pp. 112, illus. 18*).—Such matters are considered as the climatic types of the guayule areas, comparisons with other regions, and the climate of the region in which it is cultivated in the United States; the climate of the area in which the Pará rubbertree is indigenous and of the principal regions in which it has been cultivated, the ecological characteristics of *Hevea*, and the possibility of extending its cultivation into Mexico; and the distribution of *Castilloa*. Climatological maps for the three species are included.

Report of the Chief of the Weather Bureau, 1942, F. W. Reichelderfer (*U. S. Dept. Com., Ann. Rpt. Sec., 30 (1942), pp. 129–136+*).—Since much of the information that would normally be submitted in the annual report must be withheld until after the war, only certain general features of the year's work are included.

Monthly Weather Review, [January–February 1943] (*Mo. Weather Rev. [U. S.], 71 (1943), Nos. 1, pp. 1–15, illus. 7; 2, pp. 17–27, illus. 7*).—These numbers contain meteorological, climatological, solar radiation, and sunspot data.

Drouths and floods in the United States, S. S. Visher (*Econ. Geog., 19 (1943), No. 1, pp. 1–15, illus. 17*).—Because of the great significance of rainfall deficiencies and excesses, the author here summarizes, with the aid of maps, some recent American studies on their magnitude and frequency, including four sorts of conditions, viz, (1) the variation in annual and summer precipitation of relatively wet and dry years, (2) some precipitation characteristics of the extreme years and crop seasons of the 40-yr. period 1900–39, (3) the frequency of dry and wet years and crop seasons in each part of the United States, and (4) the frequency, magnitude, and effects of torrential or excessive rainfalls of various sorts. It is concluded that the precipitation conditions described merit careful consideration in all planning of wise land use.

Hydrologic studies: Compilation of rainfall and run-off from the watersheds of the Pacific Northwest Conservation Experiment Station, Pullman, Washington, 1932–40, G. M. Horner and L. M. Naffziger (*U. S. Dept. Agr., Soil Conserv. Serv., 1942, SCS–TP–43, pp. [205], illus. 138*).

Rainfall in New England.—I, Rainfall in Massachusetts. II, Rainfall in Maine, New Hampshire, and Vermont, G. V. White (*Jour. New England Water Works Assoc., 56 (1942), No. 4, pp. 405–502; 57 (1943), No. 1, pp. 15–62*).—These papers represent a continuation of the tables prepared by X. H. Goodnough (E. S. R., 63, p. 713).

Nevada cooperative snow surveys, J. E. Church and H. P. Boardman. (Nev. Expt. Sta., U. S. D. A., et al.). (*Nev. Coop. Snow Surveys, 1943, pt. 2, Mar. 1, pp. 16+*).

Utah cooperative snow surveys and water-supply forecasts, 1943, G. D. Clyde. (Coop. U. S. D. A. et al.). (*Utah Sta. Mimeog. Ser. 292 (1942), pp. [20], illus. 1*).

SOILS—FERTILIZERS

Life and work of C. F. Marbut, soil scientist (*[Morgantown, W. Va.]: Soil Sci. Soc. Amer. [1942], pp. 271, illus. 20*).—This memorial volume contains in addition to biographical data by Louise Marbut Moomaw sketches from the *Journal of Pedology* by E. H. Johnson, W. E. Ekblaw, J. G. Lipman, D. J. Hissink, E. J. Russell, N. M. Tulaikov, P. Krische, and T. D. Rice; appraisals of his work by R. S. Smith, A. G. McCall, C. B. Manifold, and H. H. Krusekopf; a bibliography; several complete papers; and abstracts and reviews of others. The papers not previously published are as follows: A Scheme for Soil Classification (pp. 143–169); Land Classification (pp. 215–227); and Soils of the Union of Socialistic Soviet Republics (pp. 227–244).

Soil survey of Dade County, Georgia, A. E. Taylor et al. (Coop. Univ. Ga.). (*U. S. Dept. Agr., Bur. Plant Indus. [Soil Survey Rpt.], Ser. 1936, No. 20, pp. 68, illus. 8*).

Soils of Wheatland County: Preliminary report, L. F. GIESEKER. (Coop. U. S. D. A.). (*Montana Sta. Bul. 409 (1943), pp. 54, illus. 5*).—This survey report adds 1,411 sq. miles to the part of Montana covered by the State preliminary survey (E. S. R., 87, p. 769).

Soil and field-crop management for the Catskill-Mohawk area of New York, A. F. GUSTAFSON. (*[New York] Cornell Sta. Bul. 789 (1942), pp. 32, illus. 12*).—The section of New York State here dealt with consists of Sullivan, Delaware, Otsego, Schoharie, and Montgomery Counties, together with the part of Herkimer south of the Adirondack State Park boundary, the central and western parts of Ulster, Greene, and Albany Counties; Schenectady County, except the northeastern part; and the southwestern part of Fulton, the extreme southeastern part of Broome, and the east-central part of Chenango Counties. Soil characteristics, crop adaptations, and soil treatment for productivity and erosion control are dealt with essentially as in previous bulletins of the soil and field crop management series (E. S. R., 87, p. 483).

Does soil conservation pay? (*Wisconsin Sta. Bul. 459 (1943), pp. [4], illus. 3*).—This bulletin briefly outlines development by soil conservation measures (carried out principally at the cost of $1.45 per acre yearly for lime and fertilizer, together with relatively small costs involved in establishing strip cropping and healing field gullies) of a run-down, badly washed hill farm property to land that now pays cash returns of $15 per acre a year above the average for La Crosse County.

Preliminary report on the algal flora of some Florida soils, F. B. SMITH and H. R. ELLIS. (Univ. Fla.). (*Fla. Acad. Sci. Proc., 6 (1943), No. 1, pp. 59–65*).

Crop residues and manure, H. W. BATCHELOR (*Ohio Sta. Bimo. Bul. 221 (1943), pp. 60–63*).—Supplemental nitrogenous fertilizers on sods of hay mixtures plowed down for corn can be expected to pay. Sweetclover plowed down at any time from early spring to flower stage may produce supplies of nitrate either untimely or excessive for the needs of the grain crop that follows. Such green manure can be supplemented with residues of wide nitrogen: carbon ratios (straw, corn stover, or soybean haulm). Strawy manure should be applied a considerable time ahead of the following grain crop. It should be applied on legume sods or be balanced with supplemental applications of nitrogen fertilizer.

The value of farm manure, G. E. SMITH (*Missouri Sta. Cir. 248 (1943), pp. 11, illus. 12*).—Practical methods of handling manure are given. The additional use of superphosphate and, on most Missouri soils, lime also is deemed necessary for maximum results.

Inspection of legume inoculants, H. R. KRAYBILL, D. M. DOTY, H. L. MITCHELL, and A. S. CARTER (*Indiana Sta. Cir. 279 (1942), pp. 4*).—This is the annual report (E. S. R., 87, p. 344) for 1942 on the effectiveness of legume inoculants and root hormone preparations as required by the Indiana State law of 1937.

AGRICULTURAL BOTANY

Fundamental principles of bacteriology, A. J. SALLE (*New York and London: McGraw-Hill Book Co., 1943, 2 ed., [rev.], pp. 643+, illus. 253*).—New edition of the text previously noted (E. S. R., 81, p. 19).

Staining methods, B. COHEN, M. W. JENNISON, J. A. KENNEDY, ET AL. (*Pure Cult. Study Bact., 11 (1943), No. 2, Leaflet 4, 8, ed., pp. 24*).—This leaflet deals with the general principles of staining, general bacterial stains, the gram stain, acid-fast staining, spore stains, staining the diphtheria organism, flagellum stains, capsule stains, spirochaete stains, and blood stains.

Studies on the action of wetting agents on microörganisms, I, II (*Jour. Bact., 42 (1941), No. 1, pp. 117–126; 45 (1943), No. 3, pp. 293–299).*

I. *The effect of pH and wetting agents on the germicidal action of phenolic compounds*, E. J. Ordal, J. L. Wilson, and A. F. Borg.—Addition of wetting agents to buffered solutions of phenolic compounds, in general, increased their germicidal activity, the specific effect being a function of both character and concentration of the wetting agent. The germicidal action of solutions containing buffer, phenol, and wetting agent was greater than that of solutions containing buffer and phenol or buffer and wetting agent at a given pH. The germicidal action of solutions containing buffer, phenol, and wetting agent decreased from pH 9 to 11, although the germicidal action of solutions of buffer and wetting agents increased in the same range, indicating that the wetting agent enhances the action of the undissociated phenol more than that of the phenolate.

II. *The synergistic effect of synthetic wetting agents on the germicidal action of halogenated phenols*, E. J. Ordal and F. Deromedi.—Sodium lauryl sulfonate and dioctyl ester of sodium sulfosuccinate were shown to enhance the germicidal effect of buffered solutions containing 2,4-dichlorophenol or 2,4,6-trichlorophenol. Evidence was obtained that this effect on the phenols was due primarily to a synergistic action between the wetting agents and the undissociated phenols. The factors determining the germicidal efficiency of mixtures of wetting agents and phenolic compounds are discussed.

Antibacterial substances produced by moulds.—II, The antibacterial substances produced by some common Penicillia, N. Atkinson (*Austral. Jour. Expt. Biol. and Med. Sci., 21 (1943), No. 1, pp. 15–16*).—Of 68 Penicilliums investigated, 18 exhibited activity against various bactera. It was found that these could be divided into two groups, one owing the antibacterial activity to penicillin and encountered as common contaminants of laboratory media and the other with this activity due to penicidin and encountered mainly on fruits and vegetables.

Two antagonistic fungi, Aspergillus fumigatus and Aspergillus clavatus, and their antibiotic substances, S. A. Waksman, E. S. Horning, and E. L. Spencer. (N. J. Expt. Stas.). (*Jour. Bact., 45 (1943), No. 3, pp. 233–248, illus. 1*).—*A. fumigatus* grown in a glucose-nitrate mineral medium produced an antibacterial substance designated as fumigacin, which is distinct chemically and in antibacterial activities from fumigatin. Fumigacin is formed in the culture medium during the early growth stages and is then gradually destroyed on further incubation. It can be concentrated and isolated by adding norit to the culture filtrate, treating the norit with ether, and finally extracting the active substance in chloroform. It is readily soluble in alcohol and only sparingly so in water. When the alcoholic solution is cooled, white, needle-shaped crystals are produced. Fumigacin is active against gram-positive bacteria and has comparatively little effect on gram-negative organisms or fungi. It is both bacteriostatic and bactericidal, the ratio between the two properties being rather wide.

A. Clavatus also produces an antibacterial substance in synthetic media designated as clavacin, which differs markedly from fumigacin both chemically and in biological activity. It is nearly as active against gram-negative as against gram-positive organisms. It is soluble in ether, chloroform, alcohol, and water and appears to be an acid. In an acid stage, it is most soluble in alcohol; as a salt it is most soluble in water. It possesses a high bactericidal action, almost comparable to its bacteriostatic properties. There is very little difference between the bactericidal action against gram-negative and gram-positive bacteria. Older bacterial cultures are more resistant than younger ones. Clavacin has not as yet been isolated in crystalline state. Both fumigacin and clavacin are fairly toxic to animals. They differ in many respects from penicillin.

The numbers of fungi, G. R. Bisby and G. C. Ainsworth (*Brit. Mycol. Soc. Trans., 26 (1943), pt. 1–2, pp. 16–19*).—A discussion and tabulation of the numbers of genera and species known (by groups) and of the number of species in Great Britain.

Victorian fungi: A key and descriptive notes to 120 different toadstools (family Agaricaceae), with remarks on several other families of the higher fungi, J. H. Willis (*[Melbourne]: Field Nat. Club of Victoria, 1941, pp. 72, illus. 34*).—A semipopular manual of these fungi for Victoria, Australia.

Aquatic Phycomycetes exclusive of the Saprolegniaceae and Pythium, F. K. Sparrow, Jr. (*Ann Arbor: Univ. Mich. Press; London: Humphrey Milford, 1943, pp. 785+, illus. 73*).—In this monographic presentation, groups of the Phycomycetes whose members are predominantly inhabitants of terrestrial host plants (e. g., *Synchytrium* and *Physoderma*) are in general not dealt with.

A Penicillium "disease" of ink, R. A. Conover and N. E. Stevens. (Univ. Ill.). (*Ill. State Acad. Sci. Trans., 35 (1942), No. 2, p. 59*).—Pale reddish-brown blemishes on the printing by ink containing ultramarine blue on soap wrappers was found to be caused by *Penicillium* sp. The cause appeared to be more complex than a simple acid-base reaction.

A method for obtaining single-spore cultures of Agaricus campestris, D. J. deZeeuw (*Phytopathology, 33 (1943), No. 6, pp. 530–531*).—Cultures of cultivated *A. campestris* were obtained from single spores isolated and placed on hanging drops over Van Tieghem cells. The most effective medium tried was agar staled by previous germination of a large number of spores of this fungus. Varietal differences in rate of germination were observed.

The botanical identity of the Hawaiian ipu nui or large gourd, A. E. Eames and H. St. John. (Cornell Univ. et al.). (*Amer. Jour. Bot., 30 (1943), No. 3, pp. 255–259, illus. 3*).—Anatomical study of the thick wall of this fruit, used by Hawaiians in the early days as a vessel, indicated it to be a true gourd, a form of *Lagenaria siceraria*, and not a squash (*Cucurbita maxima*) as has been believed. It appears that this was an extreme form of gourd developed by the Hawaiians, not known outside the Islands, and lost after contact with the commerce of the white man provided manufactured vessels.

New grasses from the Philippines and South India, J. V. Santos (*Jour. Wash. Acad. Sci., 33 (1943), No. 5, pp. 135–140, illus. 3*).—*Garnotia mindanaensis* n. sp., *Sacciolepis glabra* n. sp., and *Isachne lutaria* n. sp. are described.

Revisions of status of southwestern desert trees and shrubs, L. Benson. (Ariz. Expt. Sta.). (*Amer. Jour. Bot., 30 (1943), No. 3, pp. 230–240*).—In this taxonomic study, the genera *Ephedra*, *Washingtonia*, *Yucca*, *Agave*, *Celtis*, *Atriplex*, *Berberis*, *Platanus*, *Acacia*, *Prosopis*, *Dalea*, *Choisya*, *Sapindus*, and *Sambucus* are considered, new taxonomy being included under each.

Trees and shrubs of Champaign County, Illinois, A. W. Feldman. (Univ. Ill.). (*Ill. State Acad. Sci. Trans., 35 (1942), No. 2, pp. 60–61*).—A list by families.

A taxonomic study of the Illinois species of Rumex, S. Glassman. (Univ. Ill.). (*Ill. State Acad. Sci. Trans., 35 (1942), No. 2, pp. 63–65*).—A brief discussion, with annotated list and key to the species.

A key to the Illinois species of Solidago, D. M. Croker. (Univ. Ill.). (*Ill. State Acad. Sci. Trans., 35 (1942), No. 2, pp. 62–63*).

A checklist of the vascular plants of the University of Illinois woodlands, G. N. Jones. (Univ. Ill.). (*Ill. State Acad. Sci. Trans., 35 (1942), No. 2, pp. 71–72*).

A study of the woody plants along the streams which cross Ellis County, Kansas, S. B. Griswold. (*Kans. Acad. Sci. Trans., 45 (1942), pp. 98–106, illus. 6*).

An introduction to historical plant geography, E. V. Wulff, trans. by E. Brissenden (*Waltham, Mass.: Chron. Bot. Co., 1943, pp. 223+, illus. 35*).—This volume, translated from the Russian, consists of 11 chapters, opening with one on the scope of the subject, relationships to allied sciences, and methods of investigation, and closing with one on the concept of floral elements. Between these two, and in much detail, are considered the history of the science, types and origins of areas, parallelisms in the geographical distribution of plants and animals, artificial and natural factors in relation to the geographic distribution of plants, migrations of species and of floras and their causes, and the historical causes for the present structure of areas and the composition of floras. The foreword is by E. D. Merrill, and an introductory statement by H. M. Raup lists various significant papers, supplementing the numerous references given by the author. Subject and author indexes are provided, and bibliographic references conclude the individual chapters.

The correlation of soil pH with distribution of woody plants in the Gainesville area, W. B. De Vall. (Univ. Fla.) (*Fla. Acad. Sci. Proc., 6 (1943), No. 1, pp. 9–24, illus. 1*).—This study was begun in 1939 to obtain specific data on soil acidity in relation to *Pinus australis* and *P. palustris;* the following year the work was extended to include other dominant plants in the pine flatwoods, mixed hardwood hammock, and scrub oak ridge of the Gainesville area. Plant and soil research workers have shown that soil pH is an important factor in the distribution of plant species. In this study there was also a certain degree of correlation between pH and habitat. The 68 species included are listed with their respective pH-tolerance ranges. Woody plants were grouped into certain fidelity classes based on their sociological tendencies, and, within certain limits, these species may be used as indicators of soil pH as based on a knowledge of the habitats involved. Similar forest types may consist of a varied composition of species resulting from differences in the underlying soil structure. Each woody plant in a given habitat may be classed as a major or minor species according to its growth and occurrence as suggestive of permanency.

Prairie studies in west central Kansas: 1941, F. W. Albertson. (*Kans. Acad. Sci. Trans., 45 (1942), pp. 47–54, illus. 6*).—The prolonged drought (1933–39), leaving the vegetation of the Great Plains region at a low ebb, has been reported upon previously (E. S. R., 87, p. 36). Plants weakened by years of adversity seemed to spring forth with renewed vigor when the environal conditions of 1941 became more conducive to growth. The present paper discusses the improved climatic and soil conditions and details of the revival of forbs and weeds for which they were responsible. The greatest gain in cover was in the eastern portion of the area, but even to the west the increase was significant where a remnant of the parent vegetation remained from which young shoots could spring forth.

Sample-plot technique applied to alpine vegetation in Wyoming, S. A. Cain. (Univ. Tenn.). (*Amer. Jour. Bot., 30 (1943), No. 3, pp. 240–247, illus. 7*).—This is a report on studies of sample-plot technic in relation to the alpine vegetation of the Snowy Range, Medicine Bow Mountains, Wyo., with conclusions for the area. The alpine fell-field community of this range appears to be typical of the vegetation of similar situations in the southern Rocky Mountains.

Hydrophytes, Xerophytes, and Halophytes and the production of alkaloids, cyanogenetic and organic sulphur compounds, J. B. McNair (*Lloydia, 6 (1943), No. 1, pp. 1–17*).—In studies of a large number of plant species from widely separated genera, it was found that the electrical conductivities of the expressed sap as well as the concentrations of sulfates in hydrophytes are less than in halophytes. It was evident also that volatile organic S compounds are much more common among halophytes than in hydrophytes. Plants growing in water were found to produce smaller amounts of both alkaloids and HCN than those growing on land or in moist soils rich in nitrates. Thus the occurrence of alkaloid, cyanogenetic, and organic S compounds is in accordance with the law of mass action, though it is suggested that other factors such as age of leaves, genetic strain, climate, weather, and seasonal factors may be influential. There are 32 references.

Germination and seedling development in five species of Cypripedium L., J. T. Curtis. (Univ. Wis.) (*Amer. Jour. Bot., 30 (1943), No. 3, pp. 199–206, illus. 31*).—The effective conservation of native ladyslippers depends largely on an understanding of the reproductive habits and environal conditions necessary for population maintenance of the individual species. Accordingly, study of seed production and germination and of seedling development of five species was begun in 1938 and is here reported upon, and the implications of certain features of the early life history of these plants from the standpoint of conservation practices are briefly discussed.

Environmental and genetical variations in yield and colony size of commercial yeasts, C. C. and G. Lindegren (*Ann. Missouri Bot. Gard., 30 (1943), No. 1, pp. 71–83, illus. 11*).—By use of a test developed to indicate the efficiency of a yeast in transforming nutrients into cells, many commercial yeasts were found to produce two classes of colonies when planted on a good medium. The large smooth colonies are termed "primary" and the small variable ones "secondary" colonies. The latter are low yielders. The distinction between these two colony types fails when yeasts are planted on poor media, because the shock of transfer here in itself causes great variation in colony size.

Vitamin deficiencies in yeasts, P. R. Burkholder (*Amer. Jour. Bot., 30 (1943), No. 3, pp. 206–211, illus. 2*).—Growth responses are reported for 38 kinds of yeast cultured in a chemically defined medium with varied liver extract and vitamin supplements. Under the test conditions, 15 yeasts exhibited marked requirements for thiamin, none for riboflavin, 14 for pantothenic acid, 6 for nicotinic acid, 36 for biotin, 4 for inositol, and 6 for pyridoxine. Growth in all was augmented by adding liver extract to the medium containing 7 vitamins. Some of these yeasts may prove useful in microbiological assays for vitamins. Growth of *Saccharomyces oviformis* in an enriched medium was proportional to the pyridoxine dosage up to about 0.006γ per 6 cc. of culture fluid. Its pyridoxine requirement appeared to be rather specific inasmuch as a number of pyridine compounds related to vitamin B_6 proved inactive for growth.

Mechanism of biological nitrogen fixation, IX, X. (Univ. Wis.). (*Jour. Biol. Chem., 144 (1942), No. 1, pp. 265–271, illus. 5; 273–281, illus. 4*).

IX. *Properties of hydrogenase in Azotobacter*, J. B. Wilson, S. B. Lee, and P. W. Wilson.—Recently Phelps and Wilson (E. S. R., 87, p. 195) reported the occurrence of hydrogenase in N-fixing bacteria. In the present study the chief properties of this enzyme in *A. vinelandii* were determined with O_2 as the H_2 acceptor. Both the pO_2 and the pH_2 functions varied with the concentration of cells. The optimum pH was about 7.5 and the optimum temperature 40° C. Consideration of these characteristics led to the development of a method (described) for studying hydrogenase in *Azotobacter* and probably other N-fixing organisms.

X. *Hydrogenase in cell-free extracts and intact cells of Azotobacter*, S. B. Lee and J. B. and P. W. Wilson.—A method is described for preparing cell-free enzyme extract of *A. vinelandii* which contains an active hydrogenase capable of transferring H_2 to methylene blue or O_2. Evidence is presented that uptake of gas in a H_2-O_2 mixture by either cell-free preparation or resting suspension consists primarily in the oxidation of H_2 to water. Both cyanide and azide inhibit oxidation of H_2 by cell suspensions or by cell-free preparations. The hydrogenase activity of *Azotobacter* grown on a medium containing NH_4NO_3 is markedly decreased in comparison with that of cells fixing N. Molecular N does not inhibit H_2 oxidation by either cell suspensions or cell-free extracts. The possible relationship between hydrogenase and biological N-fixing systems is discussed from various angles.

Carbon monoxide inhibition of Azotobacter in microrespiration experiments, P. W. Wilson and C. J. Lind. (Univ. Wis.) (*Jour. Bact., 45 (1943), No. 3, pp. 219–232, illus. 6*).—Nitrogen fixation by *A. vinelandii* was specifically inhibited by CO in microrespiration tests, the range being about ten times greater than required for a similar inhibition of the symbiotic system in inoculated red clover roots. The results were almost identical with those obtained in macro total N studies, and thus confirm the reliability of the indirect microrespiration method for investigating the mechanism of biological N fixation. The chief difference was that the respiration method indicates a small but definite inhibition of nitrate reduction by CO and a somewhat more indefinite nonspecific influence on growth. Kept on a N-free medium in air, *Azotobacter* assimilated NH_4 and urea somewhat more rapidly than N. The rate of uptake of nitrate, nitrite, and asparagine was low and variable, and the same was true even to a greater degree with aspartate and glutamate. When cultures were adapted to these N sources, the rate of assimilation of nitrate and nitrite equaled or even slightly exceeded N fixation. Uptake of asparagine was likewise improved.

Azotobacter chroococcum and its relationship to accessory growth factors, L. W. Jones and J. E. Greaves. (Utah State Agr. Col.). (*Soil Sci., 55 (1943), No. 5, pp. 393–404*).—From data presented it is concluded that the following compounds are not needed for normal growth and metabolism of this organism: Ascorbic acid, biotin, carotene, colchicine, ergosterol, filtrate factor, indole-3-acetic acid, indole butyric acid, indole-3-propionic acid, γ(indole 3) *n*-butyric acid, inositol, nicotinamide, nicotinic acid, pantothenic acid, picoline, pimelic acid, thiamin, riboflavin, and pyridoxin. Thiamin, riboflavin, and ascorbic acid stimulated slightly in some concentrations, but no evidence was obtained that any of these compounds are essential or materially increase the metabolism. When grown in a synthetic medium free from accessory food factors, *A. chroococcum* synthesized biotin, inositol, nicotinic acid, pantothenic acid, pyridoxin, riboflavin, and thiamin, the amount synthesized comparing favorably with the quantities found in other plant tissues including yeast. These compounds thus appear to enter into the synthesis of the bacterial enzymes. There are 30 references.

The response of vetch and soybeans to strains of nodule bacteria, W. B. Andrews and C. F. Briscoe. (Miss. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 4, pp. 271–278*).—Soybeans were inoculated with strains of nodule bacteria differing largely in efficiency and grown on limed and unlimed soil, and a similar test was conducted with vetch which had received basic slag.

There was good correlation between increases in yield and in N content of soybeans receiving different strains of bacteria on unlimed soil but none on limed soil. All strains used on vetch increased the yield and N content. Even though the bacterial strains increased the yield of air-dry vetch from 405 to 2,302 lb. per acre, only small differences in percentage of N resulted within the strains. The efficiency of good and poor Wisconsin strains of pea root nodule bacteria was reversed on vetch in Mississippi.

The evidence suggests that increase in yield due to inoculation of soybeans and vetch is a single factor which describes the efficiency of soybean and vetch root nodule bacteria, and that N determinations are unnecessary. Either climate is a determining factor in the efficiency of pea root nodule bacteria or vetch should not be in the pea cross-inoculation group. Strains of nodule bacteria should be tested on the plant species on which they are to be used and in the climate under which they are to be grown.

Some growth responses of Soja and Vinca to vitamins, J. F. Stanfield (*Ill. State Acad. Sci. Trans., 35 (1942), No. 2, pp. 75–77, illus. 1*).

Preliminary studies on riboflavin (vitamin B_2) content of plant materials, S. A. Watson. (Univ. Ill.). (*Ill. State Acad. Sci. Trans., 35 (1942), No. 2, pp. 84–85*).—Studies on tobacco, tomato, oats, coleus, magnolia, and spinach.

Pantothenic acid content of pollen, P. B. Pearson. (Tex Expt. Sta.). (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 2, pp. 291–292*).—Pantothenic acid assay of 25 pollen samples, collected by pollen traps and mostly from more than one plant species, indicated them to average 30.3 μg. per gram on a dry weight basis. There was evidence that the pantothenic acid content varies with the species.

A preliminary investigation of the effects of naphthalene acetic acid upon the growth and composition of oats, R. B. Stephenson. (Univ. Ill.). (*Ill. State Acad. Sci. Trans., 35 (1942), No. 2, pp. 83–84, illus. 2*).

Ageing in plants, W. Crocker (In *Problems of Ageing: Biological and Medical Aspects*, edited by E. V. Cowdry. *Baltimore: Williams & Wilkins Co., 1942, 2. ed., [rev.], pp. 1–28, illus. 4*).—This critical review (E. S. R., 81, p. 346) (84 references) considers growth conditions modifying life cycle and life span, plants of definite life span, perennial plants that seed repeatedly, degeneration of plants propagated vegetatively, experimental evidence for senescence, apomixis in plants, aging in temporary organs of perennial plants, and aging of seeds.

Osmosis and osmotic pressure, H. C. Eyster (*Bot. Rev., 9 (1943), No. 5, pp. 311–324*).—In this review (150 references), the author critically analyzes the published definitions of osmosis and the concepts of osmotic pressure, in both cases also tabulating the data by subjects (general botany, plant physiology, animal physiology, chemistry) and by authors.

The osmotic vs. the respiratory rôle of sucrose in the nutrition of excised tomato roots, P. R. White (*Growth, 7 (1943), No. 1, pp. 47–51*).—In animal tissue culture nutrients an isotonic value is considered essential and is obtained largely through use of NaCl. Thus in one solution only 3 percent is provided by carbohydrate (glucose), the rest being made up by salts among which NaCl furnishes 76 percent. In the author's standard plant nutrient, on the other hand, there is no NaCl or $NaHCO_3$, the salt provides only 11 percent of the total osmotic value, and the carbohydrate (sucrose) furnishes the remaining 89 percent. In all plant tissue nutrients, one of the two major functions of sucrose is that of an osmotic agent. Because of this apparent marked difference between the basic nutrients for animal and plant tissues, an analysis of the osmotic role of carbohydrate in the two and an estimation of NaCl as a possible substitute for carbohydrate in this role seemed highly desirable. Details of an experiment are given in which at each of a graded series of total osmotic values sucrose was partially or wholly replaced by NaCl so as to provide a simultaneous graded series of sucrose: NaCl ratios. From the results it seemed clear that the "optimum" value for plant tissues corresponds with the isotonic value only under special and not entirely satisfactory conditions from the standpoint of capacity to support growth. It is suggested that a like condition may possibly hold for animal tissues, and that the emphasis commonly laid on the isotonicity of nutrient and perfusion fluids may perhaps result in use of solutions deficient in essential carbohydrate.

The rate of transpiration in two oats varieties grown under varying soil moisture levels, G. R. NOGGLE. (Univ. Ill.). (*Ill. State Acad. Sci. Trans., 35 (1942), No. 2, pp. 73–74, illus. 1*).—In both the Kherson and the Illinois 30–2088 varieties grown at all soil moisture levels, the peak of transpiration was reached the same day. After an initial fall the rate again rose, and it was at this period that the two varieties differed. The Illinois variety rapidly regained a high rate, which was maintained for the duration of the experiment, while the Kherson continued transpiration at a reduced level. The higher rate in the former appeared to be related to morphological differentiation accompanying the reproductive phase.

Nitrate absorption by plants as an anion exchange phenomenon, E. R. GRAHAM and W. A. ALBRECHT. (Mo. Expt. Sta.). (*Amer. Jour. Bot., 30 (1943), No. 3, pp. 195–198, illus. 3*).—This study of adsorption by plants as related to anion exchange phenomena is said to indicate that adsorbed nitrate ions are available for plant nutrition. Corn plants on a low-N substrate grew equally well when extra N was added in the adsorbed or the water-soluble forms. When plants were growing actively and water-soluble N was leached from cultures given N in this form, such leaching resulted in N deficiency and retarded growth, but when cultures containing adsorbed N were leached no N difference in the crop could be induced and no ill effect on the growth of the plants followed.

Nutrient deficiency studies and an improved inorganic nutrient for cultivation of excised tomato roots, P. R. WHITE (*Growth, 7 (1943), No. 1, pp. 53–65, illus. 2*).—Routine examination of the effects on growth of excised tomato roots of graded series of concentrations of all the inorganic ions in the nutrient solution used (E. S. R., 72, p. 185) except Mn, Zn, I, and B resulted in modifications which improve its effectiveness for these roots by about 25 percent. This improvement resulted mainly from a considerable increase in concentrations of Mg and of sulfate, although concentrations of Ca, nitrate, and phosphate were likewise slightly increased. The Na ion, not present in the earlier solution, was introduced as a carrier for sulfate and phosphate but without implying any intrinsic significance.

The metabolism of starving leaves, I–III, J. G. WOOD, D. H. CRUICKSHANK, and R. H. KUCHEL (*Austral. Jour. Expt. Biol. and Med. Sci., 21 (1943), No. 1, pp. 37–53, illus. 12*).

I. *Presentation of data; and the nature of respiration rate/time curves in air and in nitrogen* (pp. 38–44).—In a N atmosphere and during early starvation stages in air, changes in the respiratory rate of excised leaves of Sudan and Kikuyu grasses were associated with changes in the amounts of sucrose (or furanoses?). The climacteric rise in respiratory rate occurred only in air and was associated with oxidation of amino acids and formation of asparagine, but with only relatively small utilization of carbohydrates as respiratory substrate. Onset of the climacteric rise was determined by the initial sucrose content and its form by the relative amounts of sucrose and amino acids present.

II. *Changes in amounts of total- and chloroplast-proteins, chlorophyll, ascorbic acids, and soluble nitrogen compounds* (pp. 44–48).—Except where the carbohydrate content was high, the total protein of starved leaves decreased regularly with time to an almost constant value corresponding to the stage of full yellowing of the leaf. In carbohydrate-rich leaves, decrease in protein did not commence until the carbohydrate content had been reduced to a relatively low quantity. In Sudan grass the chloroplast protein decreased more rapidly than the cytoplasmic proteins; in Kikuyu grass both groups of proteins decreased at about the same rate. Chlorophyll and ascorbic acid decreased simultaneously with lowering in chloroplast protein, and cessation of protein hydrolysis was coincident with chloroplast disintegration. The chloroplast protein of Sudan grass contained most of the total protein-S, whereas in Kikuyu grass it is believed that chloroplast and cytoplasmic proteins had about the same S content. It is suggested that at least one factor causing protein degradation is oxidation of the amino acid cystine to sulfate at a greater rate than its formation. In N, the protein content decreased only slowly with time and an equivalent amount of amino acids was produced but no amides were formed; in air, the amount of protein decreased rapidly and the amino acids first formed were oxidized to glutamine and asparagine. Later the amides decreased in amount and there was a marked accumulation of NH_3.

III. *Changes in malic and citric acid contents and their inter-relations with soluble nitrogen compounds* (pp. 48–58).—Malic and citric acids exhibited but little change in a N atmosphere. In air, citric acid increased during the early stages of starvation but later reached a steady value or decreased in amount. Increase in citric acid was associated with decrease in sucrose and increase in amino and asparagine contents. In air, malic acid at first remained approximately constant but later increased markedly. Increase in malic acid was associated with marked increase in asparagine; later still, malic acid decreased. Interrelations among the various metabolites are discussed, and a scheme showing the possible course of metabolism during starvation is proposed. There are 40 references.

Leaf analysis as a guide to soil fertility, H. Lundegårdh (*Nature* [*London*], *151* (*1943*), *No. 3828, pp. 310–311, illus. 3*).—The advantages and possible drawbacks in use of this method are briefly summarized.

Propriedades curarizantes em algumas "strychnos" do Rio de Janeiro [The curarelike action of some species of Strychnos of Rio de Janeiro], O. V. Brazil, J. S. Campos, and J. G. Kuhlmann (*Bol. Inst. Vital Brazil, No. 24* (*1942*), *pp. 27–34, illus. 3; Eng. abs., p. 33*).—A curarelike action is reported for extracts of species found in the vicinity of Rio de Janeiro, viz, *S. triplinervia*, *S. breviflora*. and *S. aff. albiflora*. It is suggested that the presence of such alkaloids of greater or less activity is a common property of South American species of *Strychnos* and that there possibly exists a further species of the Amazon of greater toxicity than the ones here reported upon.

The photo-oxidation of chlorophyll, S. Aronoff and G. Mackinney. (Univ. Calif.). (*Jour. Amer. Chem. Soc.*, *65* (*1943*), *No. 5, pp. 956–958, illus. 2*).—Kinetic study of the photo-oxidation of chlorophylls *a* and *b* appeared to indicate this reaction to be of the second order and to have a very low quantum efficiency. A protective action of carotene on the destruction of chlorophyll was noted, which attained a constant value at a mole ratio of about 1:8.

The dependence of the quantum yield of Chlorella photosynthesis on wave length of light, R. Emerson and C. M. Lewis (*Amer. Jour. Bot.*, *30* (*1943*), *No. 3, pp. 165–178, illus. 7*).—The absorption characteristics of the pigments in the living cell were found to be so altered by extraction that conclusions drawn from comparing absorption and photosynthetic yield could lead only to tentative conclusions as to the activity of accessory pigments. Preliminary measurements of quantum yields indicated that the dependence of yield on light intensity is the same for the red, green, and blue regions of the spectrum at low intensities. Wavelengths around 480 mμ were found under certain conditions to cause large temporary changes in rate of O_2 consumption. The quantum yield was vanishingly small in the far red beyond 730 mμ, but from 730 to 685 it rose steeply to a value of about 0.09. Apart from minor variations, it maintained a constant level to about 580 mμ, then declined to a minimum of about 0.065 at 485 mμ, and rose again to nearly 0.08 at 420 mμ. The low yield at wavelengths longer than 685 mμ was attributed to failure of the lower frequency quanta to raise chlorophyll to the excited state required for the photochemical primary process. The minor variations in yield from 685 to 590 mμ seemed connected with differences in the minimum energy required for excitation of the *a* and *b* chlorophyll components. At frequencies higher than the required minimum, the results indicated that the yield for light absorbed by chlorophyll is essentially constant. When part of the light was absorbed by the yellow pigments the evidence suggested some photochemical activity on their part, but indicated that the net quantum yield for all light absorbed by these pigments must be considerably smaller than the yield for light absorbed by chlorophyll. The methods used are taken up in detail.

Relative photosynthetic capacity of stalks, leaf sheaths, and leaf blades in maize as measured by the contribution each makes to the development of the grain, G. H. Dungan. (Univ. Ill.). (*Ill. State Acad. Sci. Trans., 35 (1942), No. 2, pp. 42–44, illus. 2*).—In a group of 20 two-plant hills the ear from one stalk in each was harvested at the milk stage, all plants being left otherwise intact until maturity. At the same time, in a second group of similar hills both leaf blade and sheath were removed from one plant in each hill, and in a third group the blades only were removed—all plants in both groups then being allowed to grow to maturity. Comparing the data on the matured ears from all groups with those from the ears of group 1 harvested at the milk stage, the yield of shelled corn was found to be made up of contributions as follows: 36 percent from the green stalks alone, 17 percent from the leaf sheaths alone, and 259 percent from the leaf blades alone. Considering only the development made after treatment, the bare stalk was responsible for 11.5 percent, the sheaths for 5.5 percent, and the blades for 83 percent of the increase in yield of shelled corn. Data on increases in bushel weight and weight of 1,000 kernels and on decrease in cob weight are also given.

The nitrogen content of oat chloroplasts, A. W. Galston. (Univ. Ill.). (*Ill. State Acad. Sci. Trans., 35 (1942), No. 2, pp. 66–67, illus. 1*).—The chloroplasts were found to contain about 30–40 percent of the total leaf N in both green and chlorotic leaves at all ages studied. In any one leaf, chloroplasts produced about 30 percent of the total protein, the "cycloplasm" producing the remainder.

Effect of photoperiod on rice varieties grown in the field, H. M. Beachell. (U. S. D. A.). (*Jour. Agr. Res. [U. S.], 66 (1943), No. 9, pp. 325–340, illus. 2*).—When 10 rice varieties at different developmental stages out of doors were subjected daily to 10 hr. of daylight for 10, 20, and 30 days, the results in general indicated that plants subjected to such continuous daily photoperiods usually headed much earlier than normal day plants. The number of tillers and panicles, plant height, panicle length, and grain and straw weights were also reduced. C. I. 81C, Caloro, Kameji, Improved Blue Rose, and C. I. 4700 were classed as "sensitive" varieties, since they exhibited the greatest response at the earliest covering periods. C. I. 6993, Shoemed, Nira, Fortuna, and Rexoro were classed as "less sensitive" varieties, with a lower response, which was greatest at the later covering periods. When subjected to 10-hr. photoperiods with either a morning or afternoon light interception of 5 hr., the varieties headed slightly later than the controls. Sensitive varieties tended to head later from afternoon interception than from morning interception, whereas the less sensitive varieties showed the reverse.

Polarity in plants, R. Bloch (*Bot. Rev., 9 (1943), No. 5, pp. 261–310*).—This analytical review (287 references) concerns polarity in growth and regeneration in plant groups from slime molds to flowering plants, the physiological manifestations of polarity, and protoplasmic factors.

Induced polyploid, periclinal chimeras in Solanum tuberosum, R. E. Baker. (Univ. Nebr.). (*Amer. Jour. Bot., 30 (1943), No. 3, pp. 187–195, illus. 32*).—When dry seeds, germinated seeds, and seedlings of an inbred potato strain were treated with colchicine, two types of periclinal chimeras were obtained—one with an octoploid epidermis and tetraploid internal tissues and the other with the reverse. The first was less vigorous than untreated plants but more vigorous than the second type. This vigor decreased as the volume of octoploid tissue increased. Octoploidy is thus concluded to be of no direct value for commercial potato production. Preliminary studies indicated that tetraploid cells in the stem tip tend to be isodiametric, whereas some of the octoploid cells are elongated. The change in shape does not appear to be uniform throughout the shoot apex. The $8n$ metabolic nuclei were found to be larger than the $4n$.

Preservation of plant material, L. G. G. Warne (*Nature [London], 150 (1942), No. 3814, p. 661*).—A note on the successful use of SO_2 solution for replacing alcohol in preserving material for teaching purposes.

The relation of depth of planting to the morphology of the wheat seedling, W. A. Lunsford. (Kans. Expt. Sta.). (*Kans. Acad. Sci. Trans., 45 (1942), pp. 124–128, illus. 2*).—Varying the depth of seeding produced differences in the length of the rhizome and in the location of the crown.

Vascular differentiation in the vegetative shoot of Linum.—II, The first phloem and xylem, K. Esau. (Univ. Calif.) (*Amer. Jour. Bot., 30 (1943), No. 3, pp. 248–255, illus. 9*).—A continuation, the preceding section (E. S. R., 88, p. 747) having dealt with the procambium.

Anatomy of Taraxacum officinale 'Weber,' L. J. Gier and R. M. Burress (*Kans. Acad. Sci. Trans., 45 (1942), pp. 94–97, illus. 5*).

GENETICS

Heritable relation of wax content and green pigmentation of lint in upland cotton, C. M. Conrad and J. W. Neely. (U. S. D. A. and Miss. Expt. Sta.). (*Jour. Agr. Res. [U. S.] 66 (1943), No. 8, pp. 307–312*).—The total wax content of lint from Half and Half white lint and Arkansas Green Lint upland cottons and of the F_1, backcross, F_2, and F_3 populations of crosses between the two strains was determined. The samples represented two consecutive crop years and three sets of families representing three different crosses. The wax content of the white-lint parent varied within the low limits of from 0.48 to 0.63 percent and that of the green-lint parent between the much higher limits of from 12.64 to 15.04 percent. The F_1 was intermediate green with a mean wax content between that of the two parents but closer to that of the white parent.

Analyses of samples from the backcross, F_2, and F_3 phenotypes showed that the green lint and high wax content were closely associated. While there was no evidence against the relationship being one of genetical linkage, it is indicated that the relationship is probably a physiological one, and that the genetic factor that affects the green pigmentation also affects the wax content. The results are not deemed conclusive, but it is indicated that there is little likelihood of combining the high wax content of the green-lint strain with the white lint of commercial cotton.

Relation of green lint to lint index in upland cotton, J. W. Neely. (U. S. D. A. and Miss. Expt. Sta.). (*Jour. Agr. Res. [U. S.], 66 (1943), No. 8, pp. 293–306, illus. 2*).—A close association of green pigmentation of lint and low lint index in upland cotton was demonstrated in the F_2 segregation of a cross between Arkansas Green Lint and Half and Half white lint strains, with lint indexes of 2.75 and 7.45 gm., respectively. Linkage of genetic factors failed to account for the relationship. Evidence presented favors the hypothesis of "spurious pleiotropy." The green-lint gene affects the pigmentation in the fiber wall, and in turn the pigmentation prevents the development of the fibers. The result is that green fibers have thin walls and small minor diameters and consequently very low lint-index values.

Hybrid beef cattle for subtropical climates, A. O. Rhoad and W. H. Black (*U. S. Dept. Agr. Cir. 673 (1943), pp. 11+, illus. 7*).—The type of cross of beef cattle best suited to the humidity and high-temperature conditions of the Gulf Coast was obtained in studies at the Iberia Livestock Experiment Farm, Jeanerette, La., by first grading up the native cattle with purebred beef bulls (of the Hereford and Aberdeen-Angus breeds) and subsequently crossing with Brahman bulls. When Herefords were employed, the best results were obtained by subsequently backcrossing with this breed and finally producing animals which were ⅝ Hereford, ¼ Brahman, and ⅛ foundation breeding. Good results, but not as satisfactory, were obtained by first grading up with Hereford bulls and then crossing with Brahman bulls, producing animals ½ Brahman, ⅜ Hereford, and ⅛ foundation. Almost as good results were obtained by backcrossing half-bred Brahman bulls with purebred Aberdeen-Angus cows, producing ¼ Brahman and ¾ Angus progeny, the females of which were then mated to half-bred Brahman bulls, producing ⅜ Brahman and ⅝ Aberdeen-Angus progeny. It is recommended for the Gulf Coast area that Brahman hybrid beef-type bulls be used on range cows possessing one-half to three-fourths the blood of pure breeds. These results were based on the production of from 8 to about 100 progeny in the different crosses of the foundation cows with bulls of the pure breeds and the hybrids of Brahman bulls.

An unusual case of twinning in Jersey cattle, F. W. Atkeson, F. Eldridge, and H. C. Fryer. (Kans. Expt. Sta.). (*Jour. Hered., 34 (1943), No. 3, pp. 81–82, illus. 1*).—An account is given of two fertile Jersey sisters born in successive years with bull twins. One has calved five times with one set of twin bulls, and the other has calved four times with no twins. The dam has calved thirteen times with three sets of twins, making a total of 16 calves. It is suggested that the fertility of a heifer twinned with a bull may be hereditary.

Measuring performance of progeny of rams in a small flock, M. E. Ensminger, R. W. Phillips, R. G. Schott, and C. H. Parsons. (Mass. Expt. Sta. and U. S. D. A.). (*Jour. Anim. Sci., 2 (1943), No. 2, pp. 157–165*).—The importance of testing rams in the same year is emphasized if comparisons are to be made between them on the basis of progeny performance. A variance analysis by sires based on birth weight, weaning weight, slaughter score, and type score of 275 Shropshire and 232 Southdown lambs produced from 1931–41 showed that the amount of variance between sires was highly significant in all cases except in the type score of Southdown rams. In conducting the analysis, the grade and type were coded. Analysis by years suggested that much of the difference between the performance of progeny of sires was caused by differences in environmental conditions from year to year. A table of differences in the birth weight, weaning weight, and type score necessary to give significant results with different numbers of progency based on within-sire variations showed that much information is gained from each additional individual added up to 8 or 10 progeny. Little was gained with more than 15 progeny.

Influence of the sire on the birth weight of lambs, C. M. Kincaid. (Va. Expt. Sta.). (*Jour. Anim. Sci., 2 (1943), No. 2, pp. 152–156*).—Because of the importance found by Phillips and Dawson (E. S. R., 83, p. 234) of birth weight of lambs on survival, growth, and selection of breeding ewes, study was made of the influence of Hampshire and Southdown rams mated with native Virginia ewes on the birth weights of the lambs produced by the switch-back method of Brandt (E S. R., 79, p. 66ˀ). The analyses showed the lambs sired by Hampshire rams to be 1.05 lb. heavier at birth than those sired by Southdown rams. As the ewes increased in age from 2 to 6 yr., there was an annual increase of 0.63 lb. in the birth weight of the lambs. The study was initiated with 100 ewes divided into each of the two groups and later 50 ewes were added to the flock.

The development of an inbred line of swine (Minn. No. 1) from a crossbred foundation, L. M. Winters, R. E. Comstock, and D. L. Dailey. (Minn. Expt. Sta. coop. U. S. D. A.). (*Jour. Anim. Sci., 2 (1943), No. 2, pp. 129–137*).—Through rigorous selection and inbreeding among F_1, F_2, and backcrossed progeny from crossing Landrace and Tamworth breeds, a superior stock was developed. Only six foundation animals contributed to this stock, three of which made major contributions. In 6 yr. the coefficient of inbreeding was raised to 0.24. Wide segregation and general deterioration in performance did not occur. The hogs of the Minnesota No. 1 strain appeared longer-bodied and shorter-legged than most American breeds. These results were verified with body measurements on 28 pigs in comparison with pigs produced in five Poland-China strains. The objects held uppermost in the development of the new strain were the combination of a maximum of desirable qualities, including color, from the parental breeds and the recombinations of genetic factors resulting in the production of new and desirable characters not found in either breed.

Genetic and environmental correlations between the growth rates of pigs at different ages, L. N. Hazel, M. L. Baker, and C. F. Reinmiller. (Nebr. Expt. Sta. and U. S. D. A.). (*Jour. Anim. Sci., 2 (1943), No. 2, pp. 118–128, illus. 1*).—From analyses of the correlations of gains of pigs in three 56-day periods from birth to 168 days of age, the possibility of using the gain from 56 to 112 days was suggested for the selection of boar pigs for breeding purposes. Gains between these ages indicated them to be a better indication of hereditary growth than selection of pigs on performance at other ages. A multiple regression based on hereditary growth at five periods was only 4 percent more accurate than gain from 56 to 112 days or from birth to 168 days. Only 15, 28, and 17 percent of the variance in gains was genetic in the first, second, and third 56-day period, respectively. The study was conducted by a statistical analysis of gains in the three periods through application of variance, covariance, and path coefficients, using data and methods previously presented (E. S. R., 89, p. 44).

The anaemia of flexed-tailed mice (Mus musculus L.).—II, Siderocytes, H. Grüneberg (*Jour. Genet., 44 (1942), No. 2–3, pp. 246–271, illus. 37*).—Further study of the blood of flexed-tailed mice (E. S. R., 87, p. 497) showed the presence of erythrocytes containing easily detachable iron in addition to the hemoglobin. These cells, designated as siderocytes, were probably more abundant in anemic than in normal mice. The flexed-tailed embryos produced hemoglobin-deficient cells with abundant siderotic material throughout the whole generation of red cells. About 3 percent of siderocytes were present in these mice throughout life. Adult flexed-tailed mice were shown to have about four times as many siderocytes as 3-week-old animals, showing that the siderocytes are apparently produced in the bone marrow since the liver hemopoiesis of flexed-tailed mice deteriorates. The initial inefficient hemopoiesis is maintained throughout erythrocyte generation.

The selective elimination of silver foxes in eastern Canada, J. B. S. Haldane (*Jour. Genet., 44 (1942), No. 2–3, pp. 296–304*).—The reduction in the percentage of silver foxes killed in three regions of the Quebec Peninsula in successive years can be explained by the unusual rate at which the killing of silver foxes exceeds that of red and cross foxes. The different colored varieties crossed freely, and there was no evidence of a greater tendency to kill cross foxes than red foxes. The statistical study to show the trends was based on more than 1,000 skins of foxes killed in each of three districts in 10-yr. periods over about the last 100 yr.

Mutations in minks, M. SHACKELFORD. (Wis. Expt. Sta.). (*Wis. Acad. Sci., Arts, and Letters, Trans., 34 (1942), p. 45*).—Mutations in mink, designated as platinum and lighter brown color, were noted. In 55 litters, platinum was found due to an autosomal recessive gene.

Strains of White Plymouth Rocks for specific economic purposes, R. G. JAAP. (Okla. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 3, pp. 209–217*).—Since 27 percent of the birds banded in 1942 in connection with the Oklahoma Poultry Improvement Association were White Plymouth Rocks, strains with characteristics of this breed combined with other qualities of economic importance were established. Early feathering, Z^k, was introduced from White Leghorns by crossing Barred Plymouth Rock males with White Leghorn females. By mating late-feathering white-splashed male progeny to White Plymouth Rock females and backcrossing the early-feathering Barred female progeny to White Plymouth Rock males, dominant white was regained. True-breeding males and females for early feathering and White Plymouth Rock characters were obtained by rigid selection. Among over 1,000 chicks produced by the early-feathering strain, all were fully feathered at 6 weeks of age. Further study showed the presence of gray down of *E* chicks to be recessive to its absence. Variations in shade of gray down were observed. In 10 empirical grades, female chicks were slightly more than one grade darker than their brothers. In miscellaneous tests it was indicated that *e* may allow the presence of red tint in the down of chicks, but *E* suppressed it in chicks of white varieties. Concerning red tints in the down of White Plymouth Rock chicks, matings of five females with Rhode Island Red males showed that all birds expressing the red tint in the down were *ee*, but not all *ee* White Plymouth Rocks had reddish tint in the down. Green- or willow-colored shanks did not appear in birds carrying the barred gene, regardless of whether they were recessive or dominant whites.

The effects of heredity and of certain environmental factors on the incidence of blood spots in chicken eggs, F. P. JEFFREY and J. PINO. (N. J. Expt. Stas.). (*Poultry Sci., 22 (1943), No. 3, pp. 230–234*).—Wide differences were found in the frequency of occurrence of small blood spots in 2,380 eggs laid by 238 daughters of six White Leghorn sires whether the birds were kept in laying cages or on the floor. Strong evidence was presented that blood spots in the eggs had a hereditary basis. Violent frightening by the presence of a dog on alternate days or consecutive days at different hours with separate groups indicated that frightening did not increase the incidence of blood spots. The numbers of blood spots were reduced, however, from 11.09 percent in eggs from floor-handled pullets to 4.91 percent for those in cages.

Selecting breeding stock for broiler production, C. W. KNOX and C. D. GORDON (*U. S. Dept. Agr. Leaflet 233 (1943), pp. 8, illus. 9*).—Special attention should be given to early feathering, efficient and rapid growth, and superior development in width and length of breast.

Sight-sexing of newly hatched chicks of standard breeds, F. P. JEFFREY and W. C. THOMPSON (*New Jersey Stas. Bul. 705 (1943), pp. 8, illus. 6*).—Sight sexing on the basis of head spots, shank color, and beak color was performed with 95 percent accuracy in Barred Plymouth Rock chicks, but with only about 65 percent accuracy in Rhode Island Reds on the basis of black pigment in the head or back. The production of an autosexing strain with superior economic qualities to the Legbar is described, originating from first crossing a Brown Leghorn male with Barred Plymouth Rock females. Suitable matings and selections are suggested for the development of a superior strain.

The effect of comb and wattle removal upon testicular activity in the domestic fowl, G. L. Searcy and F. N. Andrews. (Ind. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 3, pp. 235–241*).—There was no significant difference in the semen volume, concentration, and total numbers of spermatozoa and sperm viability between dubbed and normal Brown Leghorn and Barred Plymouth Rock males. Brown Leghorns with frozen combs and wattles produced semen of inferior quality. The testes of dubbed Brown Leghorns were significantly heavier than those of the controls. However, no measurable differences were observed between the histology of testes of normal and dubbed males. The effects of dubbing on semen production were observed in 30 Brown Leghorn and 35 Barred Plymouth Rock males and testes weights of 24 Brown Leghorn and 22 Barred Plymouth Rocks.

Observations on the survival of stored spermatozoa in the genital tract of the mare, J. A. Laing (*Jour. Agr. Sci. [England], 33 (1943), No. 1, pp. 64–66*).—Of 14 inseminations of mares from 18 days to 24 hr. before ovulation (ascertained by rectal palpation) with sperm stored 24 hr., only 2 resulted in pregnancies. Both were within 24 hr. of ovulation. The survival time of sperm within the female tract was concluded to be something less than 24 hr. Ovulation of the mares was induced by prolan injections, and successful fertilization could be made within 1 day.

Oxygen consumption of fox sperm, D. W. Bishop (*Biol. Bul., 83 (1942), No. 3, pp. 353–362, illus. 4*).—The oxygen consumption of fox sperm obtained by electrical ejaculation averaged 19 mm.^{3} per 10^8 sperm hour at 37°–38° C. It was proportional to the number of sperm present in centrifuged and uncentrifuged semen samples from five foxes. There was practically no oxygen consumption by the lipoidal secretions from the preputial glands, prostatic secretions, or the urine. No oxygen consumption was detected from semen without sperm except when contaminated with epithelial cells and debris.

The effects of antigonadotropic serum on the early postnatal development of the reproductive system of the male rat, H. N. Marvin and R. K. Meyer. (Univ. Wis.). (*Anat. Rec., 85 (1943), No. 2, pp. 177–193, illus. 16*).—Injections of antigonadotropic serum from a pony, injected for from 30 to 38 mo. with aqueous extracts of sheep pituitary, were found to inhibit testes growth and retard growth of the accessory reproductive organs in male rats from the first to the twentieth day of life. Histological study showed that growth was not inhibited during the first 11 days, but differentiation was almost completely inhibited after this period. The rate of tubular differentiation and growth of the testes was maximal during the early postnatal period. There were control rats in the experiment that were not injected and others which were injected with normal horse serum.

The development of some external features in mouse embryos, H. Gruneberg (*Jour. Hered., 34 (1943), No. 3, pp. 88–92, illus. 1*).—Mouse embryos of 1 day's difference in age from 9⅓ to 18⅓ days of gestation are illustrated, and the criteria of the different ages described. Measurements of the crown rump length were both difficult and inaccurate as indications of fetal age. The results were based on 261 embryos in 37 litters. There were seven retarded embryos at different ages. The normal embryos were measured for crown rump length and averaged by litters.

The influence of time of mating on fertility, J. J. Gracewski and H. M. Scott. ([Conn.] Storrs Expt. Sta.). (*Poultry Sci., 22 (1943), No. 3, pp. 264–265*).—The percentage of fertility of 393 eggs laid by 20 Barred Plymouth Rock hens in which matings were allowed only in the afternoon was 80.9, but when matings of the same cockerels and hens were unrestricted the percentage of fertility was 71.8 percent. When matings in another group were restricted to forenoons, 54.8 percent of the eggs were fertile. With unrestricted matings in three pens of 20 hens and 2 cockerels each, the eggs laid were from 70.1 to 74.4 percent fertile. This confirms studies, by M. V. Malmstrom, that fertility was least (32.6 percent) in artificial insemination when hard-shelled eggs were in the uterus and greatest (70.0 percent) when a membranous egg was in the shell gland.

Growth of avian ovum, A. L. Romanoff. ([N. Y.] Cornell Expt. Sta.). (*Anat. Rec., 85 (1943), No. 3, pp. 261–267, illus. 3*).—The growth rates of ova of pheasants, quails, chickens, and ducks were practically identical. In shape, the egg was ovoid with the long axis perpendicular to the polar axis and usually flattened at the animal pole end. The dry matter of the eggs of these species showed a rapid increase with maturation. After the discharge of the ovum, the follicle collapses and begins degeneration. The ovarian follicles were finally completely reabsorbed.

Changes in volume and physical properties of allantoic and amniotic fluids under normal and extreme temperatures, A. L. Romanoff and F. W. Hayward. ([N. Y.] Cornell Expt. Sta.). (*Biol. Bul., 84 (1943), No. 2, pp. 141–147, illus. 12*).—The relative volume and physical properties of allantoic and amniotic fluids in different species of domestic bird eggs during incubation were nearly identical. In general, the course of the fluid changes followed the morphological age of the embryo. The volume of allantoic fluid was suppressed, and the amniotic fluid was excessively increased during the latter part of incubation at high temperatures. Data were plotted on the amount, specific gravity, and pH of these fluids and for chicken eggs incubated at 34.5°, 37.5°, and 39.5° C. The study was based on about 650 fertile eggs of White Leghorn hens, 200 ring-necked pheasants, 150 bobwhite quail, 200 White Holland turkeys, and 200 Pekin ducks.

Effect of stale sperm on fertility and hatchability of chicken eggs, A. Nalbandov and L. E. Card. (Univ. Ill.). (*Poultry Sci., 22 (1943), No. 3, pp. 218–226, illus. 1*).—Data presented show that, although stale sperm may retain their ability to fertilize eggs, the proportion failing to hatch increases with age. No unusual quantitative embryo mortality of the eggs fertilized 10 days previously was observed, but there was a strong negative correlation between the age of sperm and the age at which death of the embryos occurred. The embryos dying showed mortality on the fourteenth day when fresh sperm were used. With sperm from 1 to 10 days in the oviduct the embryos died on the eleventh day, and when the sperm were older than 11 days death occurred in from 1 to 5 days' incubation. In the conduct of the study eggs were set on the day of gathering, or after heating to 100° F. for 1 hr. each day for 7 days, or after storage at 55°–60° for 7 days. No significant difference in the fertility and hatchability of over 2,000 eggs from hens subjected to these treatments was observed. No fertile eggs were laid by three groups of from 9 to 25 hens from which roosters were removed 35 or more days previously.

Influence of estrogens and androgens on the skeletal system, W. U. Gardner and C. A. Pfeiffer (*Physiol. Rev., 23 (1943), No. 2, pp. 139–165*).—A review of 226 references on the influence of sex hormones on skeletal development in animals, including man, showed the hormones to be intimately related to histology and extent of skeletal growth. They may also be closely related to the function and influence of the pituitary gland.

The prenatal growth of the cat.—XII, The weight of the heart in the fetal and in the adult cat, H. B. Latimer (*Growth, 6 (1942), No. 4, pp. 341–349, illus. 1*).—Formulas are presented to show the relations between weight of the heart and body weights of male and female adults and fetal cats (E. S. R., 87, p. 50).

Effects of prolactin and cortical hormones on body weight and food intake of adrenalectomized pigeons, R. A. Miller and O. Riddle (*Soc. Expt. Biol. and Med. Proc., 52 (1943), No. 3, pp. 231–233, illus. 1*).—Although adrenalectomized pigeons ate little food and lost weight, prolactin injection in such animals induced more than normal gains in body weight and food intake to a level almost equal to unoperated birds. With high doses of both prolactin and adrenal cortical extract, more rapid gains in body weight and larger food intake were induced than in normal unoperated pigeons.

Influence on growth of thyroactive iodocasein, M. Koger, E. P. Reineke, and C. W. Turner. (Mo. Expt. Sta.). (*Soc. Expt. Biol. and Med. Proc., 52 (1943), No. 3, pp. 236–237*).—Virgin female mice weighing from 13 to 15 gm. treated orally or subcutaneously with thyroactive iodocasein made greater gains in weight and skeletal length during a 5-week period in three experiments than untreated controls.

FIELD CROPS

Food for freedom by better range-conservation practices in the Pacific Northwest, W. T. White, W. R. Frandsen, R. R. Humphrey, and N. T. Nelson (*U. S. Dept. Agr., Misc. Pub. 514 (1943), pp. 19+, illus. 12*).—The more important range-conservation practices which will preserve the soil and maintain or improve the forage on Pacific Northwest grazing areas are described.

New crops—old crops—more crops, H. L. Walster (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 4, pp. 3–11*).—The crops discussed are wheat, corn, alfalfa, grass, sugar beets, potatoes, flax, soybeans, field peas, proso, sorghums, and Sudan grass.

Hemp, nettles, and related plants, O. A. Stevens (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 4, pp. 16–18, illus. 3*).—Notes are given on the common and wood nettles, hemp, and related plants.

Grassland experiments, D. S. Fink (*Maine Sta. Bul. 415 (1943), pp. 191–227+, illus. 7*).—This publication deals with the results of grassland investigations in Maine over a period of 7 yr.

A brief review is given "primarily to show the development of a more productive and permanent system of grass farming in Maine and to observe the opening of new frontiers for a more active livestock industry in the State. . . . The dairy farmer of the future will make only limited, if any, use of native pasture, because other grassland crops produce more milk per acre and are more easily managed than native white clover and bluegrass. Not more than ½ acre per cow of excellent native pasture can be efficiently used on the dairy farm. This amount of improved native pasture will feed both milch cows and young stock during May and June, and feed the young stock for the remainder of the season. Annual applications of plant foods giving 60 lb. each of nitrogen (N), phosphoric acid (P_2O_5), and potash (K_2O) will maintain excellent native pasture in high production."

Much space is given to a discussion of Ladino clover, which "appears destined to place Maine agriculture more nearly on a par with more favorable alfalfa-growing regions. . . .

"The first crop from 2 acres per cow of Ladino clover, grown in association with timothy, will meet the winter roughage requirement of a dairy cow and her young stock, and the subsequent growth will furnish abundant excellent milch cow pasture from the first part of July until November. Annual applications of 8 tons of manure, fortified with superphosphate, per acre will maintain Ladino-timothy in excellent production over long periods. Ladino-timothy aftermath pasture, following the removal of the first crop for hay or silage, surpasses any other pasture crop for milch cows studied to date. Ladino-timothy produces hay comparable in yield and total composition to that of red clover or alsike clover. Ladino-timothy produces excellent silage without a preservative added, if the crop is partially air-dried and weighted down in the silo with oats or oats and field peas from about 2 acres (15 tons) which are chopped into the silo immediately following cutting. Forty lb. or more per acre of Ladino clover seed can be obtained from second-crop Ladino clover made into good hay about the middle of August and subsequently threshed. The threshed hay is readily eaten by dairy cows, and may carry 18 percent protein on a 12-percent moisture basis."

Other grassland crops investigated were zigzag clover (*Trifolium medium*) and strawberry clover (*T. fragiferum*). Zigzag clover was found not to make sufficient growth, particularly after removing the first crop, to warrant its use as a dairy cow pasture, but is thought to have a definite place in soil stabilization work and in orchards. Strawberry clover was found inferior to Ladino clover as a lowland legume because of the ability of the latter to compete with taller-growing grasses and an apparent adaptability to wetter land greater than is generally recognized.

Are you going to be short of hay this year? H. B. HARTWIG ([N. Y.] Cornell Expt. Sta.). (*Farm Res.* [*New York State and Cornell Stas.*], *9* (*1943*), *No. 2*, *p. 16*, *illus. 1*).—Practical suggestions for growing oats, especially with Canada field peas, as an emergency hay crop are given and comments made on the merits of millets, soybeans, and Sudan grass for this purpose.

Germination studies of bromegrass seed, Bromus inermis Leyss, R. F. FUELLEMAN and W. L. BURLISON. (Univ. Ill.). (*Ill. State Acad. Sci. Trans.*, *35* (*1942*), *No. 2*, *pp. 32–34*).—Whole seed germinated definitely higher than hulled seed (naked caryopses), regardless of how the hull was removed. Seed planted deeper than 1 in. was lower in emergence than seed planted at shallower depths.

What are we doing with castor beans? W. L. BURLISON and R. F. FUELLEMAN. (Univ. Ill.). (*Ill. State Acad. Sci. Trans.*, *35* (*1942*), *No. 2*, *pp. 39–41*).—Remarks on characteristics, importance, and current status of the crop include yields of castor-bean varieties in tests by the Illinois Experiment Station, 1939–41, in three localities.

Comparative yield and maturity of corn hybrids, W. WIIDAKAS (*North Dakota Sta. Bimo. Bul.*, *5* (*1943*), *No. 4*, *pp. 32–34*).—Continuing previous work (E. S. R., 87, p. 216), comparative grain and fodder yields of promising corn varieties and hybrids are reported from station tests in 1942 with average yields for 1941–42 and 1939–42. Comparative grain yields, height of ears, and lodging of selected corn hybrids and open-pollinated varieties tested at the substations and Park River in 1942 are also tabulated. The adaptability of various types of varieties and hybrids is again discussed.

Good seed potatoes greatly increase yields, M. T. MUNN. (N. Y. State Expt. Sta.). (*Farm Res.* [*New York State and Cornell Stas.*], *9* (*1943*), *No. 2*, *pp. 6*, *13*, *illus. 1*).—Test plantings of potato seed stocks on sale in 1942 revealed wide differences in yield, presence of diseases, and trueness to variety.

Pawnee potato is new variety 'tailored' for northern Colorado growing conditions, W. C. EDMUNDSON, L. A. SCHAAL, and A. M. BINKLEY. (Coop. U. S. D. A.). (*Colo. Farm Bul.* [*Colorado Sta.*], *5* (*1943*), *No. 2*, *pp. 13–15*, *illus. 1*).—This variety, resulting from 7 years' tests at Greeley, "matures early enough so that it can be harvested before the sugar beet harvest, its vine growth is comparatively small so that late spraying to combat flea beetle damage is more feasible, it produces tubers of better appearance than the leading commercial varieties grown in the Greeley district, it has good keeping quality in storage, and cooking tests show it has high quality for the table."

Potato growing in Rhode Island, T. E. Odland and C. H. Moran (*Rhode Island Sta. Misc. Pub. 5, rev. (1943), pp. 16+, illus. 1*).—This revision (E. S. R., 82, p. 766) incorporates later data but continues substantially the same recommendations.

Soybean production, T. B. Hutcheson (*Virginia Sta. Bul. 345 (1942), pp. 14*).—Suggestions are presented based on the results of experiments conducted over a period of 20 yr. in all of the more important agricultural sections of the State. The uses, varieties, soil adaptations, culture, rotations, methods of harvesting, and similar details are discussed.

Yellow Special tobacco, a new flue-cured variety resistant to black rootrot, E. M. Matthews and R. G. Henderson (*Virginia Sta. Bul. 346 (1943), pp. 7, illus. 3*).—This variety, grown on the experimental plats at Chatham since 1933, is said to be "the only root-rot resistant flue-cured variety that can be recommended for general use in Virginia at the present time," and also possesses some resistance to other diseases, such as black shank, sore shin, and damping-off. Results of tests conducted on the experimental plats and limited observations made on a number of Virginia farms indicate that it will yield approximately 100 lb. more per acre than the root-rot susceptible varieties now being grown.

Two new durum wheat varieties, G. S. Smith. (Coop. U. S. D. A.). (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 4, pp. 2–3, illus. 1*).—Carleton (I.D. 104) and Stewart (I.D. 111), new rust-resistant varieties, are briefly described.

Inspection of agricultural seeds, H. R. Kraybill et al. (Coop. U. S. D. A.). (*Indiana Sta. Cir. 281 (1942), pp. 147, illus. 1*).—Continuing this inspection (E. S. R., 87, p. 370), the purity, germination, and weed seed contents, and for legumes the hard seed content, were tabulated from tests of 1,646 of the 2,047 official samples of seed collected from dealers in Indiana during the year ended June 30, 1942.

Selective sprays for the control of weeds in Kentucky bluegrass lawns, S. C. Litzenberger and A. H. Post (*Montana Sta. Bul. 411 (1943), pp. 23, illus. 7*).—Weed control experiments with various selective sprays have been conducted on the college campus at Bozeman since 1936 to obtain a selective herbicide or herbicides which would effectively control dandelion, broad-leaved plantain, buckhorn plantain, mouse-ear chickweed, and common chickweed in Kentucky bluegrass lawns. Meo—181 and kerosene gave the most satisfactory results for the eradication of dandelion and broad-leaved plantain, while Lawn Sinox is recommended for the control of common and mouse-ear chickweeds. Sodium chlorate for chickweed control was unsatisfactory when applied as a spray at the rates of ¼ and ½ lb. per square rod of area. One and one-half and 1¾ gal. of kerosene per square rod of area consistently resulted in better kills than lower rates. Most satisfactory kills of dandelion with the least injury to the grass were obtained when kerosene was applied between September 20 and October 1. Four of the eight brands of kerosene tested were distinctly inferior, and four were distinctly superior, in their ability to eradicate dandelion.

Preliminary experiments on follow-up treatments indicate that there is no advantage in treating for dandelion eradication during 2 successive years with kerosene. Some kind of fertilizer, such as ammonium sulfate or ammoniated phosphate, should be added to the kerosene-treated area the following spring to stimulate the growth of the grass. For soils deficient in P, ammoniated phosphate (10–20–0) may be applied at the rate of 6 lb. per 1,000 sq. ft. of lawn area. Meo–181 was very effective in eradicating dandelion, broad-leaved plantain, and buckhorn plantain when applied to dry soil and foliage during September at the rate of 1⅜ gal. per square rod. Excessively shaded areas or grass seedlings less than 1 yr. old should not be treated with this herbicide because it may kill a large percentage of the grass. From the economic standpoint, Meo–181 should be used only when buckhorn plantain is the weed to be eradicated. Lawn Sinox applied in September on a clear day was most successful for the eradication of mouse-ear and common chickweeds. The best concentration was the 1:64 dilution applied at the rate of 4$\frac{1}{10}$ gal. per square rod of area. Two applications were necessary for eradication. Unless sufficient moisture is present, lawns should be thoroughly wetted down for 2 or 3 days before spraying with Lawn Sinox. The selective sprays included in these experiments killed most of the white clover found in the Kentucky bluegrass lawn plats. However, sufficient clover plants remained alive to reestablish the stands. The comparative costs of kerosene and Meo–181 in treating a square rod area of lawn were 30 ct. and $2.41, respectively. Enough Lawn Sinox to treat a square rod of lawn infested with broad-leaved plantain cost 12 ct., while it cost 63 ct. to treat a similar area infested with chickweeds.

Poison ivy, B. Maguire (*Utah Sta. Cir. 119* (*1943*), *pp. 11, illus. 4*).—The description, poisonous properties, symptoms and treatment of poisoning, and eradication of poison ivy are presented.

HORTICULTURE

Getting the most from fertilizers for vegetable crops, E. M. Rahn (*Pennsylvania Sta. Bul. 443* (*1943*), *pp. 13+, illus. 2*).—Starter solutions containing readily available plant foods were found effective in increasing early yields, especially those of tomatoes and sweet corn and, to a somewhat lesser degree, those of cabbage and snap beans. Starter solutions increased the total yields of tomatoes, cabbage, and snap beans, but were somewhat less effective with sweet corn. Of the materials tested, an ordinary 4–16–4 fertilizer was found practically as useful as other materials for all four crops. The best concentration of the 4–16–4 material was 8 lb. in 50 gal. of water. With sodium nitrate, 3 lb. in 50 gal. was optimum. Band placement of fertilizers had no significant advantage over broadcasting for tomatoes, spinach, and cabbage. Plowing down fertilizer in bands, a single band to each furrow, gave promising results, tomatoes, sweet corn, peas, and carrots responding well to such treatment with respect to total yields. Plowing down fertilizer in bands appeared preferable to broadcasting before plowing down. The application of fertilizers in solution on soils of the type used, namely, Hagerstown silty clay loam, was of doubtful value and was conceded to be a cumbersome method.

The value of filter press cake as a fertilizer for vegetable crops.—Preliminary trials with tomatoes and cucumbers, A. Riollano (*Jour. Agr. Univ. Puerto Rico* [*Univ. Sta.*], *26* (*1942*), *No. 4, pp. 99–104; Span. abs., p. 104*).—Filter press cake, a refuse from sugar mills, was found useful for fertilizing tomatoes and cucumbers. When applied at the rate of 12 tons per acre plus 1,000 lb. of an 8:10:15 fertilizer, the cake caused significant increases in yield of tomatoes, 20.5 percent over the plats supplied with the 1,000 lb. of fertilizer alone. Favorable results were obtained also with cucumbers.

Fertilizing vegetable canning crops in 1943, C. B. Sayre (N. Y. State Expt. Sta.). (*Farm Res.* [*New York State and Cornell Stas.*], *9* (*1943*), *No. 2, pp. 1, 8–9, illus. 1*).—Information is given as to existing fertilizer restrictions, recommendations for fertilizers for vegetable crops under 1943 conditions, and upon effective methods of fertilizer application and use.

Home storage of vegetables and fruits, J. H. Beattie and D. H. Rose (*U. S. Dept. Agr., Farmers' Bul. 1939* (*1943*), *p. 29+, illus. 22*).—This revision of Farmers' Bulletin 879 (E. S. R., 38, p. 241) presents information as to storage in the home basement and in outdoor facilities, methods of handling the produce, specific recommendations for various vegetables and fruits, undesirable combinations of products, etc.

Increase yields of wax beans with "hormone" insecticide dusts, T. C. Allen and E. Fisher. (Wis. Expt. Sta.). (*Canner, 96* (*1943*), *No. 22, pp. 12–13*).—Dusts and sprays were applied in 1942 to wax and Refugee beans in an attempt to prevent the dropping of blossoms and small pods, a condition observed to be serious in Wisconsin in certain years. In some cases naphthaleneacetic acid was applied singly and in other cases with the insecticides rotenone and pyrethrum. Pods were harvested five times during the growing season. Significant increases in yield were recorded from dust treatments to wax beans, but none with the Refugee bean. Sprays appeared to give no increases with either type of bean. The addition of pyrethrum or rotenone did not decrease the effectiveness of the naphthaleneacetic acid. Apparently the observed increase in yield came from a larger number of small pods rather than from an increase in the size of pods. Further work was contemplated.

Fertilizers for sweet corn, F. S. Prince and P. T. Blood (*New Hampshire Sta. Cir. 63* (*1943*), *pp. 8*).—Experiments conducted on Paxton loam, a soil distributed widely in the southern and central parts of the State, showed that larger yields of sweet corn could be produced with manure, properly supplemented with fertilizer, than with fertilizer alone. Amounts of a 4–8–4 or a 4–16–4 fertilizer up to 1,000 lb. per acre proved profitable where no manure was used. Larger amounts are not recommended from an economic viewpoint. With small amounts of fertilizer a high-phosphorus formula proved slightly superior, but with larger applications the difference in formulas became less significant. An application of 15 tons of manure plus 400 lb. of superphosphate produced almost as much sweet corn as did 30 tons supplemented in a like manner. In addition to manure and superphosphate 200 lb. of a 4–12–4 formula applied in bands proved worth while, apparently stimulating the young plants until their roots reached the broadcast materials. Results of side dressing with Chilean nitrate were not highly conclusive. Rainfall during August appeared to exert an influence on the effectiveness of side dressings.

Hop growing in New York State is slowly expanding, J. D. Harlan. (N. Y. State Expt. Sta.). (*Farm Res.* [*New York State and Cornell Stas.*], *9* (*1943*), *No. 2, p. 5, illus. 1*).—The author discusses the climatic and soil requirements of hops, the extent of production, outlook for the future, new varieties, etc.

Effects of certain growth-regulating substances on growth correlation in lettuce seedlings, R. B. Stephenson. (Univ. Ill.). (*Plant Physiol., 18* (*1943*), *No. 1, pp. 37–50, illus. 9*).—In each of four series, (1) intact seedlings, (2) excised roots, (3) excised shoots, and (4) a combination of (2) and (3), thiamin, thiourea, nicotinic acid, naphthaleneacetamide, naphthaleneacetic acid, and indoleacetic acid were added to the culture medium of inorganic salts and sucrose in concentrations from 0.01 to 10 mg. per liter. In the control culture, excised root growth was benefited slightly by the presence of shoot tissue in the medium, the growth of adventitious roots on the excised shoots exceeded generally that of roots on the intact seedling, and a further slight stimulation in the development of adventitious roots occurred on the excised shoot when excised root tissue was present. In the presence of thiamin and nicotinic acid the stimulation in root development on the excised shoots by the presence of root tissue did not occur. These substances disturbed apparently the usual reciprocal relationship between root and shoot observed in the controls. Thiourea did not appear to affect this relationship. Naphthaleneacetic acid caused an increase in the growth of excised roots alone, both over the controls and over those in naphthaleneacetic acid where shoot tissues were present. Great stimulation of root growth occurred in all four series in the 0.1 and 0.01 mg. per liter concentrations of both naphthaleneacetic acid and indoleacetic acid. Naphthaleneacetamide was much less stimulative, the growth of roots in the three series of shoots following the trend of the controls.

Head-lettuce tests, G. W. Schneider and R. Stroud (*New Mexico Sta. Bul. 301 (1943), pp. 16, illus. 4*).—Time-of-planting trials conducted at the main station indicated that August 20 and September 1 are satisfactory dates, with the latter somewhat hazardous in years when autumn temperatures are low or when early freezes occur. The planting date best adapted for producing a spring crop of lettuce was about December 1. The Imperial 44 variety appeared best adapted for the autumn crop but was not well adapted for the spring crop because of a susceptibility to tipburn. Imperial 850 gave better results with the spring crop. Farther north at Albuquerque, August 1 to August 20 for the November crop and October 10 to November 10 for the May crop were found to be satisfactory dates. Head lettuce sown in the spring did not give promising results. Imperial 44 was the most promising variety for both autumn and spring. Planting on the south side of a ridge extending east and west gave better results than north-side planting with overwintered lettuce. The August-sown crop for November harvesting appeared most promising from a market standpoint. Some general cultural information is included.

A key to pea varieties, B. L. Wade (*U. S. Dept. Agr. Cir. 676 (1943), pp. 12, illus. 5*).—In addition to the key, which includes 73 varieties, there are suggestions for seedsmen for simplifying the number of varieties kept in stock. The varieties included are mostly of some current importance, but a few are of historical interest. The key is based on node of bloom, type of vine, smoothness or wrinkledness of seed, degree of pod bluntness, foliage color, seed color, pod size, and *Fusarium* wilt resistance.

Growing field peas, E. J. Delwiche and J. H. Lilly (*Wisconsin Sta. Bul. 457 (1942), pp. 8, illus. 2*).—Information is presented on selection of favorable soil sites, the importance of adequate drainage and the use of rotations, preparation of the soil, rates of seeding, use of fertilizers and manure, varieties, inoculation, harvesting operations, and the control of aphids and weevils.

Inoculation: A source of nitrogen for peas, A. W. Hofer. (N. Y. State Expt. Sta.). (*Farm Res. [New York State and Cornell Stas.], 9 (1943), No. 2, pp. 4, 14*).—A 5-yr. study of the value of pea inoculation showed that while not always beneficial, inoculation under certain conditions can increase yields. Increases from inoculation were noted chiefly in fields not recently in peas, beans, or other legumes. The possibility of the presence of some agent harmful to nodule bacteria in fields grown recently with legumes is suggested. Practical recommendations are presented for the grower.

Relation of an essential micro-element to seed production in peas, H. S. Reed. (Univ. Calif.). (*Growth, 6 (1942), No. 4, pp. 391–398, illus. 2*).—Dwarf Telephone pea plants grown to maturity in aerated nutrient solutions containing no zinc and supplied with zinc in amounts ranging from 0.05 to 0.5 p. p. m. showed a clear-cut response to zinc, both in growth and reproduction. Plants which had additions of less than 0.01 p. p. m. of zinc ceased growth, and the tops of the majority were dead when the plants were 7 weeks old, although the roots were still in good condition. With 0.05 to 0.5 p. p. m. of zinc, plants produced approximately the same dry weights of tops and roots at maturity (at 14 weeks), but there was an increase in the dry weight of seeds with the increasing concentrations of zinc due to the more complete development of the seed. No pods or seeds were produced in cultures with less than 0.05 p. p. m. of zinc. The large well-filled seeds produced at the higher concentration was evidence of the importance of an ample supply of zinc for seed production in the pea.

The Pennheart tomato, C. E. Myers (*Pennsylvania Sta. Bul. 438 (1943), pp. 10+, illus. 7*).—Pennheart, a new, extra early maturing, scarlet-fruited tomato of determinate growth habit, was obtained by crossing the Oxheart variety with Penn State Earliana. At State College this new variety, on the basis of 7 years' testing, proved superior to all leading commercial early-maturing varieties with respect to earliness, percentage of marketable fruits, fruit weight, and yield when planted at its optimum spacing, made possible by the compact type of growth. When grown under unfavorable conditions the fruit may not be smooth, but that this is an environmental response was indicated by the good results obtained when seed saved from this uneven fruit was grown the succeeding season in a favorable locality. It is pointed out that Pennheart is not a main-season variety. The plants should not be pruned or staked and should be set rather closely to do their best.

Tomato production in Kansas, S. W. Decker and W. G. Amstein (*Kansas Sta. Bul. 313 (1943), pp. 30, illus. 7*).—General information is offered on tomato culture, including climatic factors affecting the crop, selection of soils, soil preparation and care, use of fertilizers, irrigation requirements, selection of varieties for different sections of Kansas, plant production, planting operations, pruning and staking, varieties, protection from insects and diseases, etc.

Propagation of fruits for the home orchard, C. H. Ragland (*Mississippi Sta. Bul. 375 (1943), pp. 20, illus. 24*).—General information is presented on methods of propagation by seeds, cuttings, layers, grafts, and buds, with specific instructions for the apple, pecan, fig, grape, quince, blackberry, dewberry, and strawberry.

Use of Malling and other dwarf apple rootstocks, W. W. Smith (*New Hampshire Sta. Bul. 345 (1942), pp. 42–43*).—Trees on Malling III and IV set in the orchard in 1938 were very productive, especially when worked with the Golden Delicious variety. In some cases, early fruiting may have dwarfed the trees too severely for best orchard results. Florence Crab proved better than Virginia Crab as a body stock for McIntosh, Northern Spy, and Cortland. There was some evidence of partial incompatibility between certain red strains of McIntosh and Virginia Crab.

Effect of transplanting 4-year-old apple trees on yield, C. W. Ellenwood (*Ohio Sta. Bimo. Bul. 221 (1943), pp. 83–84*).—Yield records on Stayman Winesap trees which were moved in 1920 when 4 yr. old and on other trees which were not so treated showed considerably less production in the moved trees in the subsequent years. The author suggests that if 1-yr. trees had been set at the time of moving they would have produced as much fruit as the transplanted trees and at a lower cost.

Effect of fertilizing elements on apples, L. P. Latimer and G. P. Percival (*New Hampshire Sta. Bul. 345 (1942), pp. 41–42*).—Soil collected from beneath the tree affected severely with arrowhead leaf scorch was supplied with molybdenum (Mo), Ca, Mg, K, and Zn, and combinations of Ca and these elements. At the same time, soil taken from beneath a healthy tree was used as a control. Seedlings of Wealthy apples were planted in all the pots. Growth was best wherever Ca was used, the best growth being recorded where Ca and K were applied in combination. Good growth was obtained with Mg alone and with K alone, also with Zn. The controls which received only distilled water died during the test, and those supplied with tap water grew very poorly. Mo had no effects. Plants receiving a combined K and Mg treatment failed to make appreciable growth. In field experiments, apple trees receiving less than 5 lb. of borax applied to the soil grew vigorously. Above 5 lb., the leaves were reduced in size and were of a pale color. Immature apples on trees receiving 10 or 20 lb. of borax were yellowish rather than normal dark green.

Magnesium deficiency—a newly recognized orchard trouble, D. Boynton. ([N. Y.] Cornell Expt. Sta.) (*Farm Res.* [*New York State and Cornell Stas.*], *9* (*1943*), *No. 2, pp. 2, 13, illus. 1*).—The symptoms of magnesium deficiency on the leaves of the apple are described and illustrated. The trouble is said to be relatively rare in New York orchards and to occur most commonly in orchards located on very acid soils that are low in available calcium and magnesium. Methods of prevention are discussed.

Thinning apple fruits and changing the year of bearing by spraying with dinitro compounds, F. S. Howlett (*Ohio Sta. Bimo. Bul. 221* (*1943*), *pp. 84–92*).—Exploratory trials with various materials that might be used to destroy apple blooms in the on year and thus promote greater fruiting in the off year suggested that various factors, such as variety, environmental conditions, and thoroughness of application, are involved. There was severe injury to the foliage which was open at the time of the application. The effects of the various materials tested are described, and suggestions are made to growers who may wish to test the method in a preliminary way with a warning that much more work is needed before such flower removal technics can be recommended.

Abnormal preharvest drop of apples, C. W. Ellenwood (*Ohio Sta. Bimo. Bul. 221* (*1943*), *pp. 92–95*).—An abnormal preharvest drop was recorded in Ohio orchards in October 1942, with as much variation between trees of a given variety as between distinct varieties. Attempts to explain the causes of the unusual drop were not successful. It was observed that twice during the period September 27–30 minimum temperatures of 27° F. were recorded. The beginning of the drop was not accompanied by excessive rainfall. Pressure readings on the fruits did not show any unusual drop in pressure in Delicious, Stayman Winesap, or Rome Beauty just prior to the drop. The need of determining some practical way of anticipating such abnormal drops is stressed.

Premature dropping of fruits with special reference to McIntosh apples, L. P. Latimer (*New Hampshire Sta. Bul. 345* (*1942*), *p. 43*).—No significant results were obtained with McIntosh trees sprayed with naphthaleneacetic acid just as the fruits began to drop. That the time of application is important was indicated in branch spraying experiments, where September 22 treatments resulted in some decrease in drop as compared with the controls.

Changes in apples during ripening and storage, W. W. Smith (*New Hampshire Sta. Bul. 345* (*1942*), *pp. 43–44*).—Some evidence was obtained that in certain seasons apples from trees on a low N level were less subject to brown core in storage than apples from high N trees. There appeared to be an association between wet growing seasons, or low temperatures during ripening, and the occurrence of brown core. Apples held at 40° F. in a room where the concentration of CO_2 was maintained at 11 to 12 percent kept free from brown core and until the last of March were more crisp than fruits stored in normal atmospheres at 32°. However, apples removed from storage in April developed scald quickly and had an off-flavor.

Effects of waxing and pre-storage treatments upon prolonging the edible and storage qualities of apples, C. W. Hitz and I. C. Haut (*Maryland Sta. Bul. A14 (1942), pp. 46+, illus. 10*).—Waxing treatments were found to be highly significant in reducing weight losses in Grimes Golden apples during cold storage and in the subsequent poststorage period at 50° to 60° F. At the time of removal from cold storage, 21 or 22 weeks after harvest, the unwaxed Grimes Golden apples of all harvest dates and preripening treatments for the 3 yr. involved, averaged a 56-percent greater weight loss than comparable waxed fruits. For the entire experimental storage period, extending over 24 weeks and including a poststorage period at 50° to 60°, the difference, averaged for 2 yr., amounted to 53 percent. In studies with Golden Delicious in 1938, the unwaxed fruits lost 30 percent more of their weight than did the waxed at the time of removal from cold storage. The reduction in wilt caused by the waxing treatments had marked commercial significance. Unfortunately waxing increased the severity of superficial scald in Grimes Golden, but the exposure of the fruits, prior to cold storage, to a week of 60° temperature in a closed room either reduced or precluded the development of scald on both waxed and unwaxed fruits. Fruit which was preripened for 1 week before waxing developed a desirable bright yellow color which became intensified during storage. On the other hand, waxing without the week of preripening retarded the rate of ground color change in both varieties. With progressive harvesting, the mature fruits showed a proportional reduction in scald. The thiocyanate spray used in 1940 increased color slightly but tended to increase the severity of scald. Golden Delicious apples given any preripening treatment colored more satisfactorily during storage but deteriorated more rapidly following storage.

Peach growing in Massachusetts, J. S. Bailey (*Massachusetts Sta. Bul. 399 (1943), pp. 16+, illus. 10*).—Information is given on the status of peach production in the State, hazards of winter injury, selection of orchard sites, varieties, planting plans, soil management, pruning, fruit thinning, diseases and insects and their control, spray programs, harvesting and marketing, etc.

Some newer peach varieties for south-central Pennsylvania, C. O. Dunbar (*Pennsylvania Sta. Bul. 442 (1943), pp. 10+*).—The characteristics of a large number of the newer varieties of peaches are set forth in detail. Varieties which appeared desirable under southern Pennsylvania conditions were Raritan Rose, Triogem, Sunhigh, Halehaven, Goldeneast, Summercrest, White Hale, Afterglow, and Lizzie. Redhaven, Kalhaven, Newday, Pacemaker, Midway, and Redrose are promising but untested new varieties. Valiant, Vedette, and Veteran, Canadian varieties, may also be good, but observations were limited. Varieties considered of doubtful value in southern Pennsylvania were Mikado, Buttercup, Marigold, Oriole, Cumberland, Southhaven, July Elberta, Eclipse, Primrose, Fertile Hale, and Hopefarm.

Plant characters of cherry varieties, A. P. French (*Massachusetts Sta. Bul. 401 (1943), pp. 23, illus. 14*).—Studies of 1- and 2-year-old nursery trees budded on mahaleb stock and growing side by side on the station grounds revealed that varieties may be distinguished by detailed observations on such characters as habit of growth; color of bark; lenticel development; position, size, shape, folding, color, and texture of the leaves; length, thickness, and color of the petioles; size, shape, and position of the glands on the petioles; etc. The outstanding characteristics of various sweet and sour cherries are set forth, with applicable illustrations.

Small fruits for the home garden, L. Havis (*Ohio Sta. Bimo. Bul. 221 (1943), pp. 45–49*).—General information is presented on varieties, soil preparation, planning, culture, pruning, propagation, etc.

Winter storage of strawberry plants, L. P. Latimer (*New Hampshire Sta. Bul. 345 (1942), p. 48*).—Plants stored in moss, sawdust, peat, or sand were compared with those transplanted directly from the beds in spring. Peat proved to be the best medium for plants held at 32° [F.] from November to May. The peat-stored plants formed more runners than did any of the other lots, including the direct-from-the-field transplants. Plants stored with their roots unprotected were dead at the end of the storage period.

Borax on strawberries (*New Hampshire Sta. Bul. 345 (1942), p. 49*).—Borax applied in early spring at the rate of from 50 to 100 lb. per acre caused injury to plants and reduced yields. When applied at the time the runners were forming in early August, the highest yields were obtained from areas which received no borax or 25 lb. of borax per acre.

Blueberries in the garden, C. S. Beckwith (*New Jersey Stas. Cir. 457 (1943), pp. 4*).—Information is given on various cultural aspects of blueberry production, such as the selection of soils, varieties, planting, fertilizers, pruning, control of pests, climatic requirements, etc.

Factors influencing injury to cranberry plants during flooding, N. E. Stevens and N. F. Thompson (*Wis. Acad. Sci., Arts, and Letters, Trans., 34 (1942), pp. 73–81, illus. 1*).—The most obvious conclusion from the observations reported seems to be that experience in one marsh does not furnish a safe guide for use on another unless conditions are very similar. Though, in general, injury to submerged plants is less likely to occur if flooding is done on clear, or at least only partly cloudy days, there appear to be certain Wisconsin marshes where photosynthesis is so limited by other factors that little is gained by the presence of abundant light. Among these factors appears to be an extreme scarcity of bicarbonates in the flooding water. In most reservoirs where there is little water movement and the amount of dissolved oxygen is small, the lower levels are extremely deficient in oxygen. Thus draining from the bottom for the sake of obtaining cooler water appears very dangerous. If experience has shown that the flooding period must be short, the best practice would apparently be to flood the marsh during one night or early morning and remove it the following night or early morning.

Grapes for different regions, C. A. Magoon and E. Snyder (*U. S. Dept. Agr., Farmers' Bul. 1936 (1943), pp. 38+, illus. 4*).—Superseding Farmers' Bulletin 1689 (E. S. R., 67, p. 259), this presents information as to native grape species and their location and use, either in development of horticultural varieties or as rootstocks. The United States is divided into nine districts, and varieties suitable to each are designated. Information is presented on winter protection of vines, and descriptive and other notes are given on a large number of cultivated varieties both of the American and European types.

Ridges and sectors induced in the rind of citrus fruits by fumigation with hydrocyanic acid, W. B. Sinclair and D. L. Lindgren. (Calif. Citrus Expt. Sta.). (*Plant Physiol., 18 (1943), No. 1, pp. 99–106, illus. 4*).—Studies of the ridging of citrus fruits led to the conclusion that fumigation with hydrocyanic acid gas when the fruit buds are in a certain stage of development is a factor. In the navel orange, the Valencia orange, and grapefruit, February fumigations produced usually a maximum of ridged fruits. However, in some years fumigations in late January caused much injury. With the lemon, the danger period was much longer, with fumigations from late January to April being hazardous. The development of ridges and sectors on citrus fruit depends mainly on the stage of development of the buds at the time the trees are fumigated.

Effect of solar radiation intensity on the vegetative growth and yield of coffee, J. Guiscafré Arrillaga and L. A. Gómez (*Jour. Agr. Univ Puerto Rico [Univ. Sta.], 26 (1942), No. 4, pp. 73–90, illus. 4; Span. abs., pp. 89–90*).—Arabian coffee grown under lath shades so spaced as to provide approximately two-thirds, one-half, and one-third full sunlight showed the need of shade. The trees under two-thirds and full sunlight were sickly and stunted and produced low yields. There was no statistical difference between the yield of trees receiving one-third and one-half full sunlight, but growth was definitely greater in the one-third sunlight trees. Growth and yield were positively correlated. An average of 53,143.20 gm. calories per square centimeter per year was determined as the optimum cumulative solar radiation for yield and growth of coffee. This condition could be obtained under the natural shade of guaba (*Inga*) trees planted not less than 16 by 16 ft. apart.

Culture studies of the drug plant Atropa belladonna, E. N. Stillings and A. Laurie (*Ohio Sta. Bimo. Bul. 221 (1943), pp. 64–74, illus. 3*).—Belladonna seeds were found to germinate slowly and unevenly, but with pretreatment with sulfuric acid, soaking in water, and starting in high temperature and high moisture, a 50-percent germination was obtained. No important yield differences were recorded whether the plants were handled in pots, bands, or in flats prior to setting in the field. Plants set in the field in late April or early May were successful and could endure light frosts. A planting distance of 12 in. in the row and 30 in. between rows is suggested as desirable in large-scale operations. Assays of belladonna plants produced in the open and under cloth or laths showed the need of full light. Fertilization was found necessary for high yields on soils not well supplied with available nutrients. Good drainage was highly important. Comparisons between greenhouse and outdoor plantings showed that the crop cannot be grown profitably under glass. Methods of harvesting and drying are discussed.

Contribution to the morphology and anatomy of guayule (Parthenium argentatum), E. Artschwager (*U. S. Dept. Agr., Tech. Bul. 842 (1943), pp. 34, illus. 41*).—The results of a detailed study, supported by appropriate drawings and photographs, are presented on this rubber-producing plant. Most of the material used was obtained from plants grown at State College, N. Mex., and imported some years earlier from various parts of the Big Bend area of Texas and from Salinas, Calif. In plants of proper harvesting age, by far the largest amount of rubber was found in the vascular rays of the phloem and, to a lesser extent, in those of the xylem. Smaller amounts were found in jacketing cells of the resin canals, and rather insignificant quantities in the pith, primary cortex, and xylem parenchyma. Since rubber storage appears to be related to structure, varieties with a greater storage space for rubber should supply better raw material for selective breeding work than would varieties in which the secondary cortex is thin, even though both varieties might rate high in percentage of rubber. An anatomical approach to an improvement program with guayule would afford a scientific basis of selection and help attain the desired goal more rapidly.

A civilian program for tree protection, M. A. McKenzie (*Massachusetts Sta. Bul. 397 (1942), pp. 30+, illus. 23*).—The author discusses the practical and aesthetical value of shade trees, points out the many troubles—insect, fungus, and physical—which beset them, gives suggestions for preventing and correcting many of these troubles, discusses the pruning and bracing of weakened trees, and outlines various tree protection and improvement practices. Special consideration is given to the menacing Dutch elm disease which, in 1942, was found in certain areas in western Massachusetts.

FORESTRY

Woodlands in the farm plan, J. F. Preston (*U. S. Dept. Agr., Farmers' Bul. 1940 (1943), pp. 22+, illus. 8*).—This presents general information on the relation of woodlands to the farming enterprise; lands suitable for wood production; and essentials of woodland management, with reference to planting, improvement cuttings, pruning, thinning, protection from fire and from overgrazing, and control of erosion. Information on the income and returns from well-managed woodlands is included.

Practical forestry in the Hudson highlands, H. H. Tryon (*Black Rock Forest Bul. 12 (1943), pp. 50*).—The thesis is advanced that the most practical and least expensive form of applied forestry in a given area is one that seeks to work in harmony with nature. With no examples of virgin forest at hand, the author discusses the probable composition of the original forest in the area and outlines a tentative program that would lead to its approximate restoration. The species present in the virgin forest are believed to be still present, but in a changed numerical distribution caused by cutting, fires, etc. It is suggested that white pine did not likely occur in pure stands, but rather as a mixture with native hardwood. Sugar maple is evidently tending to become more numerous, but it is not expected to assume a dominant position except on certain favorable sites. Improvement cuttings should be carefully planned so as to avoid overexposure of the forest floor and the stimulation of competitive weed and sprout growth. In an appendix are hints on the handling and sowing of forest seed and on the advantages of mixed over pure stands.

Response of eastern white pine reproduction in the southern Appalachians to liberation, A. A. Downs. (U. S. D. A.). (*Jour. Forestry, 41 (1943), No. 4, pp. 279–281*).—On the Toccoa Experimental Forest, Ga., the liberation of eastern white pine reproduction from a decadent hardwood overstory resulted in from 17 to 62 percent greater height growth than on control plats. The smaller trees showed the greater response. Damage to pine reproduction, following the treatment, by falling limbs or snags was slight. With trees below 11 in. in diameter, poisoning was somewhat more effective than girdling in reducing sprouting of oaks and hickories but not of sourwood which sprouted prolifically, grew vigorously, and menaced definitely the white pine reproduction.

Pine seed-spot protection with screens in California, J. Keyes and C. F. Smith (*Jour. Forestry, 41 (1943), No. 4, pp. 259–264, illus. 5*).—The authors discuss the manufacture and use of wire screen domes for the protection of seed spots. Limitations of the method exist where large rodents, such as ground squirrels and wood and kangaroo rats, sometimes push the domes off the seed spot and occasionally where alternate freezing and thawing disturb the domes. On the other hand, domes gave good protection from small mammals and birds. The use of rapidly germinating seed increased materially the effectiveness of the method. Stratification of the seed prior to planting hastened germination. Domes were found to cause appreciable differences in light intensity and soil temperature beneath them.

Ice breakage in partially cut and uncut second-growth Douglas-fir stands, W. F. McCulloch (*Jour. Forestry, 41 (1943), No. 4, pp. 275–278*).—A survey was made, following a severe ice storm in western Oregon, of the damage to partially cut and uncut second-growth stands of Douglas fir. In a stand where 36 percent of the trees had been cut, largely intermediates, 41 percent of the residual stand was lost. In a stand where 16 percent of the trees had been removed, largely the codominants and dominants, 68 percent of the residual stand was lost. In a stand where a 60-percent cut was distributed over all classes, 37 percent of the residual stand was lost through snow break, and 6 yr. later 75 percent of the residuum was lost by ice damage.

A tree classification for aspen, jack pine, and second-growth red pine, S. R. GEVORKIANTZ, P. O. RUDOLF, and P. J. ZEHNGRAFF. (U. S. D. A.). (*Jour. Forestry, 41 (1943), No. 4, pp. 268–274, illus. 2*).—In this paper there is described a tree classification which has been found applicable to jack pine, aspen, and second-growth red pine growing in northern Minnesota and which is believed to have much wider application. Essentially, the proposed classification makes possible the identification in the forest of the type of tree which is most likely to retain or increase its vigor upon release. The proposed method should have material value in marking stands for intermediate cutting.

Use of native Michigan timber in the box and crate industry, F. H. VOGEL. (Coop. U. S. D. A.). (*Michigan Sta. Spec. Bul. 323 (1943), pp. 43, illus. 6*).—This bulletin is designed to suggest possible avenues of increased efficiency and expansion wherein the Michigan wood container industry might grow and thereby offer a greater and more profitable outlet for native raw materials. Information is presented on the economic and social value of the box and crate industry, location of manufacturers, distribution and ownership of industries by counties, demand for boxes and crates in Michigan, sources of raw materials, volume of lumber used by the box and crate industry, designs for boxes and crates, methods of manufacture, box and crate prices, competitive status of the industry, recommendations for a more efficient use of Michigan woods, probable price range for raw materials, etc. Appended are lists of Michigan container manufacturers included in the study and literature citations.

Treating fence posts with pentachlorphenol-fuel oil solutions, C. S. WALTERS ET AL. (Ill. Expt. Sta. and U. S. D. A.). (*Jour. Forestry, 41 (1943), No. 4, pp. 265–268*).—The cold soaking of fence posts in a solution of pentachlorophenol and fuel oil gave promise for farm use. Posts may be cut and peeled during the winter season when the farmer is less occupied with regular activities. The highest average absorption for eastern white pine, namely, 3.5 lb. of solution per cubic foot, was obtained by treating in a 7.5-percent solution for 68 hr. With aspen, willow, and red oak posts, averaging approximately 5 in. in top diameter and soaked for 48 hr. in a 10-percent solution, the average absorption varied from 1.8 to 2.6 lb. per cubic foot of wood. Since pentachlorophenol caused injury to the hands when left on the skin for any length of time, the authors suggest the use of Neoprene or rubber gloves during handling.

The composition of paper and paperboards manufactured in 1939, R. V. REYNOLDS and A. H. PIERSON (*U. S. Dept. Agr. Cir. 668 (1943), pp. 23, illus. 3*).—This circular shows the quantities of various materials composing the principal papers and paperboards made in the United States in 1939, a year undisturbed by war and for which census data were available. Conversion factors are presented showing the statistical relationship of the six classes of paper to the component wood pulps, and also of the wood pulps to pulpwood, based on average practice in the United States. The authors suggest that the data as of 1939 may serve for some years as an anchor point for wartime calculations.

DISEASES OF PLANTS

Virus diseases (*Ithaca, N. Y.: Cornell Univ. Press, 1943, pp. 170+, illus. 23*).—In the realm of viruses and virus diseases, nothing is at present settled. Nevertheless, many facts about these peculiar agents have been established and are sufficiently interesting and important to warrant being brought together under one cover. In this set of "Messenger Lectures," by members of the Rockefeller Institute for Medical Research, six virus workers have attempted to do this for the fields with which they are familiar. The foreword is by T. M. Rivers. Copious bibliographies conclude each of the following: Virus Diseases With Particular Reference to Vaccinia, by T. M. Rivers (pp. 3–31); Chemical Structure and the Mutation of Viruses, by W. M. Stanley (pp. 35–59); New Hosts as a Key to Progress in Plant Virus Disease Research, by L. O. Kunkel (pp. 63–82); Swine Influenza, by R. E. Shope (pp. 85–109); Human Influenza, by F. L. Horsfall, Jr. (pp. 113–143); and Viruses and Tumors, by P. Rous (pp. 147–170).

New and interesting plant diseases, W. C. MOORE (*Brit. Mycol. Soc. Trans., 26 (1943), pt. 1–2, pp. 20–23, illus. 2*).—Miscellaneous notes are presented on a *Fusarium moniliforme* disease of corn seedlings grown in nutrient solution, a rot of bulbs of *Scilla* spp. due to *Penicillium hirsutum*, and a bulb canker of garlic due to *Helminthosporium allii*.

The measurement of plant diseases in the field: Preliminary report of a subcommittee of the society's plant pathology committee, W. C. MOORE (*Brit Mycol. Soc. Trans., 26 (1943), pt. 1–2, pp. 28–35, illus. 2*).—This is a discussion of the technic of measuring plant disease intensity, with presentation of the results obtained in 1941–42 relative to various fungus and virus diseases of such crop plants as potato, sugar beet, wheat, and apple.

The Plant Disease Reporter, [March 15–May 1, 1943] (*U. S. Dept. Agr., Bur. Plant Indus., Soils, and Agr. Engin., Plant Disease Rptr., 27 (1943), Nos. 5–6, pp. 117–156, illus 4; 7–8, pp. 157–186, illus. 3*).—The following are included, in addition to the host-parasite check-list revision, by F. Weiss—Nos. 5–6, *Aegilops* to *Agropyron*, and 7–8, *Agrostis* to *Aristida*—(the present section of the revised check list, and those to follow until further notice, will be restricted to host plants belonging to the Gramineae, including cereals, pasture and range grasses, and other economic members of the family):

No. 5–6.—Maryland field corn leaf blight disease survey, 1942, by E. A. Walker and J. W. Magruder; soybean diseases in Minnesota, by I. W. Tervet; acreages of peanuts and disease losses in 1942; corn seed treatment experiments in 1942, by A. J. Ullstrup; chemical seed treatments for corn, by D. H. Bowman; *Crotalaria spectabilis* immune to root knot nematode; potato, tobacco, and onion diseases in Massachusetts in 1942, by O. C. Boyd; hosts of viruses on vegetable seedlings (compiled by Cornell University); seed treatments for the victory garden, by G. L. McNew; new seed protectants, by B. H. Davis; and new disinfectants for sweetpotatoes, by J. A. Pinckard and W. S. Anderson.

No. 7–8.—Spread of *Cephalosporium* wilt of persimmon, by B. S. Crandall; diseases of vegetables in western Oregon in 1942, by F. P. McWhorter, P. W. Miller, C. E. Owens, and J. A. Milbrath; seed-borne inoculum of *Phomopsis vexans*—its extent and effects, by R. P. Porter; disease control with Fermate and Spergon, by J. T. Middleton; and tests with some vegetable seed protectants, by B. H. Davis and C. M. Haenseler.

Notes on plant diseases in Kansas in 1941, C. O. JOHNSTON, (Kans. Expt. Sta. coop. U. S D. A.). (*Kans. Acad. Sci. Trans., 45 (1942), pp. 107–110*).—Seasonal notes on important or unusual diseases—mostly rusts—of cereal and forage crops and flax, with briefer mention of various plant diseases of minor importance.

Diseases of plants in Jamaica, E. B. MARTYN (*Jamaica Dept. Sci. and Agr. Bul. 32, n. ser. (1942), pp. 34+*).—A manual.

On the generic names Pseudomonas, Xanthomonas ,and Bacterium for certain bacterial plant pathogens, W. J. DOWSON (*Brit. Mycol. Soc. Trans., 26 (1943), pt. 1–2, pp. 4–14*).—Based on data presented and discussed, the author recommends that the generic names *Erwinia, Escherichia, Eberthella,* *Salmonella*, and others of Bergey's Enterobacteriaceae be discarded; that *Bacterium* Ehrenberg 1828 be designated as a nomen conservandum; that the type species be designated as *B. coli* Escherlich 1885; and that the genus *Bacterium* be so defined as to include not only those species universally regarded as constituting the colon-typhoid-dysentery group but also the peritrichous plant pathogens. A list, with synonyms, is presented of the gram-negative bacterial plant pathogens to be included in the three genera *Pseudomonas* Migula em. Dowson 1939, *Xanthomonas* Dowson 1939, and Bacterium Ehrenberg em. Dowson 1939.

The antagonism of Actinomyces to Fusarium oxysporum cubense, C. H. Meredith (*Phytopathology, 33 (1943), No. 5, p. 403*).—A species of *Actinomyces* was isolated which dissolved the mycelium of *F. oxysporum cubense*, lysis being completed in 9 days.

The effect of soil and chemical mixtures on the growth of Fusarium oxysporum cubense, C. H. Meredith (*Phytopathology, 33 (1943), No. 5, pp. 398–400*).—Of the 100 chemicals studied, 21 inhibited growth of the fungus at 1 part per 100 or less of soil. The 8 P compounds gave greater growth at 1-percent concentration. Of the 12 Hg compounds, 11 inhibited growth at less than 1 part per 10,000.

Pathogenicity studies with Fusaria isolated from tobacco, sweet potato, and cotton, T. E. Smith and K. J. Shaw. (N. C. Expt. Sta. coop. U. S. D. A. et al.). (*Phytopathology, 33 (1943), No. 6, pp. 469–483, illus. 2*).—Field observations suggested that the Fusariums of wilt in sweetpotato and cotton also cause wilt in tobacco. Pathogenicity trials of fresh isolates or cultures supplied by others were tested on flue-cured and Burley tobacco, sweetpotato, and cotton, 53 cultures from tobacco proving pathogenic for sweetpotato or cotton but not for both. The particular race pathogenic for sweetpotato was obtained from nearly all collections in North Carolina, South Carolina, and Georgia from flue-cured tobacco and in Maryland from Maryland tobacco. Races pathogenic for sweetpotato or cotton were obtained in equal numbers from Burley and dark tobaccos. The 22 collections from sweetpotato were all pathogenic for Burley tobacco and some but not all for flue-cured tobacco, but none were pathogenic for cotton. The 19 collections from cotton were all pathogenic for Burley tobacco, slightly so or nonpathogenic for flue-cured tobacco, and nonpathogenic for sweetpotato. All 94 collections could be grouped into 3 physiologic races by results on the 4 test plants used. Obviously, crop rotations combining sweetpotato and all types of tobacco should be avoided, as well as those combining cotton and Burley or dark tobaccos, but field experience shows that flue-cured tobacco may be safely grown in rotations with cotton.

The life history of Phytophthora cactorum (Leb. & Cohn) Schroet., E. Blackwell (*Brit. Mycol. Soc. Trans., 26 (1943), pt. 1–2, pp. 71–89, illus. 7*).—Consideration is given the vegetative growth form and perennation of the mycelium; interrelationships, development, and germination of the sporangium, conidium, resting conidium, and chlamydospore; fertilization of the oogonium and antheridium; and dormancy and germination of the oospore.

A study of some factors affecting the pathogenicity of Verticillium alboatrum R. & B., C. D. McKeen (*Canad. Jour. Res., 21 (1943), No. 3, Sect. C, pp. 95–117, illus. 9*).—An epidemic of *Verticillium* wilt occurred in the Niagara Peninsula in 1940, involving many host plants. Although the seven fungus isolates varied slightly in morphology and pathogenicity, they were all referred to *V. albo-atrum*. A considerable amount of inoculum was demonstrated in the soil in 1941. The optimum temperature for vegetative growth of the pathogen is about 24° C., but wilt symptoms appear slightly sooner and the temperature range of heavy incidence is broader at high than at optimum soil moisture. The fungus persisted and was equally aggressive after 3 mo. in three types of soil under cropped and fallowed conditions, except where fallow was dry. Growing susceptible hosts did not influence the activity of the pathogen more than did an immune host, but addition of green plant residues and two organic acids caused a slight suppression. On examining the soil and air temperatures and precipitation (May–August 1939–42), it was found that temperatures high enough for disease development are unlikely to be encountered in the area before late June, and then the disease develops seriously only when the soil moisture is uniformly high during May–July. The relative infrequency of serious outbreaks of this wilt on the Niagara Peninsula thus appears due to the low soil moisture ordinarily pertaining during that part of the growing season when soil temperatures are high enough to favor the fungus.

Damping-off of seedlings, infectious and non-infectious C. M. Haenseler and V. A. Tiedjens (*New Jersey Stas. Plant Disease Notes, 20 (1943), No. 11, pp. 44–47*).—A general comparison of the symptoms, causes, and control of the fungus and noninfectious types of damping-off, the latter usually due to some unfavorable chemical condition of the soil itself such as excessive amounts of soluble salts.

Physical characteristics of bordeaux mixture in relation to its qualities, E. E. Wilson. (Univ. Calif.). (*Phytopathology, 33 (1943), No. 6, pp. 497–505, illus. 2*).—In the laboratory tests reported upon, bordeaux precipitate made by mixing diluted components settled more slowly and was more bulky than that made by mixing concentrated components before dilution. The precipitate particles in the former were nearly all fragments of closed cells that ruptured during the reactions between the components or during the moderate agitation given, and the membranous fragments were thin, pliable, and possibly in a high state of hydration. The particles resulting from the second method of mixing were in many cases agglomerations of lime held together by closed membranes which did not easily rupture during the reaction and were apparently not readily broken by agitation. In three weathering tests on twigs of apricot and peach trees during winter (rainfall totaling 3–4 in.), bordeaux prepared with diluted components lost only 18, 34, and 38 percent of the Cu, whereas that prepared with concentrated constituents lost 65, 70, and 58 percent, respectively. Vigorous and prolonged agitation of the concentrated type improved its suspension quality. In two of the three tests the diluted type bordeaux deposited more Cu than the concentrated type, but the initial deposit of the latter was more visible on peach twigs because of its coarser texture.

Fermate—a promising new fungicide, J. M. Hamilton and D. H. Palmiter. (N. Y. State Expt. Sta.). (*Farm Res. [New York State and Cornell Stas.], 9 (1943), No. 2, p. 14, illus. 1*).—Results of tests with Fermate at Geneva since 1940 are said to indicate that it may have a place in the spray programs for apple and stone fruits.

Studies with silver compounds and mixtures as fungicidal sprays, L. W. Nielsen (*[New York] Cornell Sta. Mem. 284 (1942), pp. 44, illus. 3*).—In the search for substitutes for Cu and S spray materials, over 70 Ag sprays were studied by the Hamilton-Weaver method (E. S. R., 82, p. 495) for fungicidal activity and adhesiveness in the greenhouse, with potato plants and *Phytophthora infestans* as test organisms. The oxide, iodide, hexacyanoferrate, and dichromate of Ag, the dichromate and the sulfite in bentonite, 3 Ag mixtures containing $MnSO_4$, $Fe_2(SO_4)_3$, and $FeSO_4$, in addition to $Ca(OH)_2$, proved the most promising salt combinations tested. Composition studies of the $AgNO_3$ and metal-sulfate mixtures indicated the most favorable concentration of metal sulfates to be one equal to the molecular concentration of the $AgNO_3$ in the respective mixtures. The concentration of the third component (lime) most suitable for best adhesiveness of these sprays differed for each mixture. For the Ag and $FeSO_4$ mixture, lime containing sufficient $Ca(OH)_2$ to react chemically with the $AgNO_3$ and the $FeSO_4$ gave the most adherent mixture. The relative concentrations of the three components making up this spray with 100 p. p. m. of Ag were 0.158 gm. $AgNO_3$, 0.258 gm. $FeSO_4.7H_2O$, and 0.154 gm. of lime (73 percent $Ca(OH)_2$) per liter of spray. The Ag and $FeSO_4$ mixture was the most adherent of the several promising silver sprays, under the same conditions being about equal to that of 3-3-50 bordeaux. As compared to three substitute copper sprays having a copper concentration of 1 lb. per 50 gal., the Ag and $FeSO_4$ mixture adhered better than Nichols Z-O, as well as Cuprocide H-112, but less well than Spraycop. Data on the field performance of this spray are not available.

The elemental sulfur fungicides, A. B. Groves (*Virginia Sta. Tech. Bul. 82 (1942), pp. 61, illus. 37*).—Elemental S has long been used as a fungicide and still occupies a place of major importance. Though flowers of S, self-boiled lime-sulfur, and dry mix are useful forms, they have now been largely replaced by proprietary wettable products and flotation S. Crude S of 99.5+ purity constitutes the stock source for most prepared products and is obtained from domestic sources. The particle size of these fungicides has shown a continued decline during recent years, with a resultant increase in effectiveness due to better coverage and adhesion as well as an increase in surface exposure of the particles. Fractionation of the manufactured S is accomplished principally by roller fixed-hammer, and Micronizer mills and the Grinrod emulsification process. Flotation S is a by-product in which S is either precipitated from an alkaline solution or recovered by gaseous adsorption in filter boxes. Finely divided S is rendered suitable for sprays by addition of conditioning, wetting, or dispersing agents. Improvements in wetting properties have resulted in recent years, largely through the adoption of newly developed organic surface-active agents. The elemental S fungicides are too fine for sieve analysis and must therefore be determined by such technics as sedimentation, microscopic analysis, turbidimetric analysis, air permeation, and molecular absorption. A photometric technic used in classifying the products employed in this study is described, and a classification of the material into four groups is discussed in detail and also presented in graphic form. These groups include the (1) flotation and Grinrod process S; (2) slightly coarser materials, mostly Micronized products; (3) conventionally milled products suitable for use as peach fungicides and as cover sprays on apples; and (4) the coarser products, largely offered as, and suitable for, peach fungicides. A fifth group of unique products not readily classifiable by particle size alone is also included. Photomicrographs of all materials described are presented. There are 29 references.

Tetrachloro-p-benzoquinone, L. J. Klotz and J. T. Middleton. (Calif. Citrus Expt. Sta.). (*Citrus Leaves, 23 (1943), No. 3, pp. 11-13*).—In the search for substitute materials for the scarce metallic fungicides, the organic chemical tetrachloro-*p*-benzoquinone showed such promise in controlling citrus brown rot as to recommend its trial by growers on a small block in comparison with bordeaux. The experiments reported again confirm the value of Cu in the protection against brown rot, and suggest that any one of six spreader-stickers will give effective coverage and adherence to the fruit surface.

Plot technique for disease-control studies on fine turf, F. B. Struble (Pa. State Col.). (*Phytopathology, 33 (1943), No. 6, pp. 528-530, illus. 1*).—A description, with diagram, is given for a useful and handy method for laying out plats of 1,000-sq.-ft. area on irregular areas such as golf greens. The method is said to be workable and easy to employ.

Australian rust studies.—VI, Comparative studies of biotypes of race 34 of Puccinia graminis tritici, W. L. Waterhouse and I. A. Watson (*Linn. Soc. N. S. Wales, Proc., 66 (1941), pt. 5–6, pp. 269–275, illus. 1*).—Continuing this series (E. S. R., 74, p. 794), comparisons were made between a culture of *P. graminis tritici* isolated in the United States and a standard Australian culture of the same race. At St. Paul, Minn., fixed Australian crossbreds gave no reliable proof that the biotypes differ. F_3 lines from two crosses which had been tested in Australia with race 34 showed similar reactions when tested with a U. S. A. biotype of this race. Inbred ryes of known reactions to the Australian biotype gave quite different reactions when tested with the U. S. A. biotype. Differential varieties recorded as showing a changed reaction to race 34 in Australia, owing to a lowered temperature, did not thus change when tested with the U. S. A. biotype. At the University of Sydney, side-by-side comparisons of the two biotypes were made under varying temperature and light conditions. Differential varieties, previously reported to give a change in reaction with lowered temperature, did thus change when tested with the Australian biotype, but did not with the U. S. A. biotype. Color differences were discernible between the two biotypes. On certain varieties not included in the set of differentials, the two biotypes exhibited different reactions.

The results indicate that the normal method of sorting out physiologic races by the reactions shown on certain differential hosts that have been empirically selected does not necessarily sort out entities that are identical. Physiologic races bearing the same designation may be different. Clearly, physiologic races do not represent the final stages in the analysis of a rust culture. It is believed that the term "biotype," as suggested by Christensen and Rodenhiser (E. S. R., 84, p. 28) for the smut fungi, describes these entities.

A browning reaction to stem rust in wheat, H. Hart and J. L. Allison. (Minn. Expt. Sta.). (*Phytopathology, 33 (1943), No. 6, pp. 484–496. illus. 5*).—The deep brown discoloration about infection centers and accompanied by reduced sporulation has been associated with certain wheat varieties infected with particular races of stem rust at temperatures exceeding 28.5° C. The host cell walls may be discolored and slightly thickened, but the most striking change is in rust hyphae and haustoria, which are partially or wholly ensheathed and often resemble miniature urediospores and teliospores in pigmentation, shape, and construction about the middle, in verrucose to echinulate wall markings, in apparent thin areas in the walls resembling germ pores, and in papillate apical thickenings. Browning occurs in both susceptible and resistant hosts and is more often associated with races 34 and 15 of *Puccinia graminis tritici* than with other races.

Eradication of 14 million barberry bushes protects Colorado grain from stem rust, E. A. Lungren. (Coop. U. S. D. A.). (*Colo. Farm Bul. [Colorado Sta.], 5 (1943), No. 2, pp. 11–13, illus. 2*).—Sowing stem rust-resistant and early-maturing grain varieties, seeding spring grains early in well-prepared soil, and eradication of the remaining rust-susceptible barberry bushes are the recommended control measures.

Seed-borne moulds of barley, H. W. Mead (*Wallerstein Labs. Commun., 6 (1943), No. 17, pp. 26–32, illus. 4*).—A review of the present status of knowledge on the seed-borne smuts, root rot fungi, saprophytic molds, and bacteria of barley.

The bulb or stem nematode on alfalfa, sweet clover, and white clover, O. F. Smith and M. W. Allen. (U. S. D. A.). (*Phytopathology, 33 (1943), No. 6, pp. 525–526, illus. 1*).—In an alfalfa field near Reno, Nev., plants of alfalfa, white sweetclover (*Melilotus alba*), and white clover were found infested with *Ditylenchus dipsaci*, and cross-inoculations proved that but one strain was parasitic on these hosts.

The composition of white clover leaves as affected by rust and by sulphur, J. T. SULLIVAN and S. J. P. CHILTON. (U. S. D. A. et al.). (*Phytopathology, 33 (1943), No. 5, pp. 401–402*).—Both leaf rust (*Uromyces trifolii*) and S affected the composition of white clover plants. Sulfured plants therefore cannot be used as controls in determining the effects of rust on certain chemical constituents. On unsulfured plants, rusted leaves were lower in moisture and protein and higher in ash, fat, and fiber- and N-free extracts than nonrusted leaves of the same plant.

Leaf blight of corn, C. W. ELLETT. (*Ohio State Univ.*). (*Phytopathology, 33 (1943), No. 5, pp. 407–408*).—Two organisms found involved in leaf blight of dent corn hybrids in Ohio were *Phytomonas stewartii* and *Helminthosporium turcicum*. The latter was more prevalent, and marked differences were noted in susceptibility of different lines, crosses, and hybrids.

Phoma terrestris in the roots of mature maize plants, H. JOHANN. (U. S. D. A. and Wis. Expt. Sta.). (*Phytopathology, 33 (1943), No. 6, pp. 526–528, illus. 1*).—*P. terrestris* was found in the cortex and stele of pink roots of yellow dent corn in the field at Madison, Wis. (1941–42). It is believed that this condition in mature corn plants has not hitherto been ascribed to *P. terrestris* within the root tissue.

Scolecospores in Diplodia macrospora, P. E. HOPPE. (U. S. D. A. and Wis. Expt. Sta.). (*Phytopathology, 33 (1943), No. 6, p. 528*).—A culture of *D. macrospora* with scolecospores was isolated from a market sample of corn from Maryland, the first instance of this species in a 10-yr. corn-ear-rot survey involving about 3,000 cultures of *D. zeae* from the State. This is also believed to be the first record of the species for Maryland.

A description of the fungus causing cotton rust, and a preliminary survey of its hosts, J. T. PRESLEY and C. J. KING. (U. S. D. A.). (*Phytopathology, 33 (1943), No. 5, pp. 382–389, illus. 2*).—A connection is established between *Aecidium gossypii* and a rust of *Bouteloua*, but the fungus differs in at least one taxonomic character from species hitherto described on this host and is described as *Puccinia stakmanii* n. sp. By greenhouse inoculations, 48 cultivated varieties of cotton in 4 species, 10 species of wild cotton, and other malvaceous hosts representing 5 species were exposed to germinating telia. According to the results, all cultivated cottons under *Gossypium hirsutum*, *G. barbadense*, and *G. hopi* were classed as susceptible; of the 3 varieties of *G. arboreum* tested, 2 were resistant and 1 was mildly susceptible; and of the 10 wild cotton species 8 were mildly susceptible and 2 susceptible. The other 5 malvaceous hosts were classed as resistant. Among the grasses, 22 species in 3 genera were inoculated with aecia from infected cotton; 4 of the 5 *Bouteloua* spp. tested were susceptible and 1 was mildly susceptible, whereas the 8 *Muhlenbergia* spp. and 9 *Sporobolus* spp. inoculated were resistant. The severity of infection on cultivated cottons depends on conditions of summer rainfall and humidity and on the amount of inoculum available. It is thus indicated that the practice of clean culture, including marginal areas, should prove of value in controlling the disease.

Root-rot disease of cotton in the Punjab, R. S. VASUDEVA (*Indian Farming, 3 (1942), No. 10, pp. 536–538, illus. 5*).—Of the 3.1 million acres devoted to cotton in this area, a moderate estimate of the average annual loss is set at 3 percent from infection with *Rhizoctonia solani* and *Macrophomina phaseoli*, both of which are said to be capable of causing root rot jointly or independently. The disease was markedly reduced by shifting the sowing date for both American and desi cotton from May to about the end of June, but the yield of seed cotton was sometimes adversely affected. Remunerative returns were obtained from the late-sown crops by closer planting.

Vapor action of certain fungicidal materials prepared for dusting cotton seed, S. G. LEHMAN. (N. C. Expt. Sta.). (*Phytopathology, 33 (1943), No. 6, pp. 431–448*).—When cottonseeds were confined with vapors arising from Ceresan or New Improved Ceresan, they condensed thereon in sufficient amounts to inhibit growth of such seed-infesting fungi as *Glomerella gossypii*, *Fusarium moniliforme*, and species of *Rhizopus*, *Aspergillus*, and *Cephalothecium*. Preparations containing ethyl mercury borate and ethyl mercury iodide were likewise effective. Mercurial vapors from these preparations were also lethal to *G. gossypii* conidia on filter paper or on mycelium in petri dishes and were retained for a considerable time after removal to the open air, but more tenaciously by the conidia than by the filter paper. The order of decreasing effectiveness was Ceresan, ethyl mercury iodide, New Improved Ceresan, and ethyl mercury borate. Sanoseed gave good control when applied directly to the seed, but not as a vapor at 38° C. or lower. Because of the volatility of the two Ceresans (effective at 5°–38°) and their property of condensing and adhering to the seed, relatively small amounts are needed. Tests of Semesan, creosote dust, benzol, benzine, Para Bacca, and picric acid showed no inhibitory effect of their vapors on air-dry conidia of *G. gossypii*, but marked reduction or prevention of germination was effected by vapors of alkyl mercuric acetylene urea, Leytosan, 154–6B, chloropicrin, ethyl ether, and trioxymethane. Alkyl mercuric acetylene proved only partly effective as a fungicidal fumigant.

Chlorotic dieback of flax grown on calcareous soils, H. H. FLOR. (U. S. D. A. and N. Dak. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 4, pp. 259–270, illus. 3*).—This nonparasitic disease was found associated with certain unproductive soil areas in the Red River Valley, N. Dak. When flax was grown experimentally in soils representing successively deeper layers, the disease was least severe in surface soil and increased in severity for successively lower horizons. Chemical tests of soil from an unproductive area, as well as growth of flax in such soils that had been steamed or leached, failed to indicate any toxic substance. Flax grown in unproductive soils to which mineral amendments had been added responded favorably to phosphate. The chlorotic phase of the disease was more pronounced in the wetter soils, but plants grown on either wet or dry soil were stunted and developed leaf necrosis and stem dieback. The symptoms were most severe at low soil temperatures and were progressively lower in intensity with rise in temperature from 12° to 25° C. Flax on unproductive soil responded more favorably to increase in soil temperature than that on productive soil. On Bearden silt loam, phosphate corrected both the unproductiveness and the disease symptoms, but similar applications to Fargo clay soil were only partially corrective. It is suggested that the flax trouble at low soil temperatures is due at least in part to deficiency or unavailability of essential minerals, especially phosphate, in the highly calcareous alkaline soil.

Why and how to treat peanut seed, L. SHAW. (N. C. Expt. Sta.). (*N. C. Agr. Col., War Ser. Ext. Bul. 18 (1943), pp. 8, illus. 3*).—Experimental and demonstrational results (including 1942) on peanut seed treatment indicate it to offer a means of insuring good stands. Data on treating materials, rates and methods of application, and costs are given.

Factors inducing mineral-deficiency symptoms on the potato plant, G. A. COWIE (*Ann. Appl. Biol., 29 (1942), No. 4, pp. 333–340, illus. 1*).—Data are presented on observations derived chiefly from 24 replicated manurial trials in 1937 and 25 further trials of a different design in 1938. Leaf scorch and other K-deficiency symptoms on the aerial part of the plant are normally induced by NP and not by N treatment. The presence of scorch on the N plats in a number of trials was satisfactorily correlated with a high level of available P in the soil. An increase in the N level in the NP treatments resulted in the intensification of the K-deficiency symptoms. A certain interaction between N and phosphates is shown to be the primary factor in inducing K-deficiency symptoms on the above-ground part of the plant. Blackening of cooked tubers, hitherto assumed to indicate K deficiency, was found due to a combination of high N and low K in the soil. P deficiency was induced by N and by NK treatments, but more strongly by the latter. P-deficiency rather than K-deficiency symptoms became evident on the N plants under conditions of low P and low K in the soil. Ca-deficiency symptoms appeared at three centers on poor sandy soils with pH values of 4.5–5. No signs of Mg deficiency were detected at any center during either season, nor, with one exception each year, were there any significant yield responses to Mg.

Late blight of potatoes in Colorado, L. A. Schaal and W. C. Edmundson. (U. S. D. A.). (*Amer. Potato Jour., 20 (1943), No. 4, pp. 86–88*).—Seasonal notes for 1942 are presented relative to the unusually heavy infection by *Phytophthora infestans* for the area, with about 15 percent of the commercial crop lost through tuber rotting. Heavy snowfall the preceding winter had prevented freezing of the soil, and the many volunteer potato plants noted in the spring may have provided the initial infection for the epidemic. The evidence pointed to much tuber infection from irrigation water.

Potato refuse piles as a factor in the dissemination of late blight, R. Bonde and E. S. Schultz. (Coop. U. S. D. A.). (*Maine Sta. Bul. 416 (1943), pp. 229–246+, illus. 8*).—Since in spite of an extensive spray program among Maine farmers, late blight (*Phytophthora infestans*) still causes big losses, a study was conducted to determine the primary source of infection in Aroostook County. Only one field case was found where the blight had originated from planting a diseased tuber, and all attempts to create epidemics by this method failed. A 5-yr. survey indicated that late blight often develops early in plants growing on refuse piles and is disseminated by air currents to nearby fields before the first spraying. It is believed that this is the chief source of primary infection. Burning is recommended as far better than the dump pile for disposal of waste potatoes.

Potato cull piles as a source of late-blight infection, R. Bonde and E. S. Schultz. (Maine Expt. Sta. and U. S. D. A.). (*Amer. Potato Jour., 20 (1943), No. 5, pp. 112–118*).—The data here presented are for the most part those in the preceding entry.

Control of potato blight (Phytophthora infestans) by spraying with suspensions of metallic copper, E. C. Large (*Nature [London], 151 (1943), No. 3820, pp. 80–81*).—This preliminary report on spray tests with finely divided metallic Cu at three locations indicates a very marked fungicidal activity against *P. infestans*, and the possibility of its use against scab on Cu-sensitive apple varieties is suggested.

The 'blotches' on leaves of Arran Pilot potatoes, F. M. L. Sheffield (*Ann. Appl. Biol., 29 (1942), No. 4, pp. 341–345, illus. 11*).—About flowering time a grayish green blotch appears on some leaves of this variety. It is due to necrosis of the epidermis, followed by cell division in the palisade tissue and resulting in the formation of several layers of small thin-walled colorless cells. This proliferation may occur on both sides of the leaf or on the upper side only. The new tissue partially masks the green color of the plastids in the cells nearer the center of the leaf. After a few weeks the central tissue dies. The blotching, believed almost certainly of genetic origin, is discussed in comparison with other plant effects resembling it in one or more ways.

A differential medium for the isolation of Phytomonas sepedonica, E. A. MARTEN, C. V. LOWTHER, and J. G. LEACH. (W. Va. Expt. Sta.). (*Phytopathology, 33 (1943), No. 5, pp. 406–407, illus. 1*).—Isolation of the potato ring rot organism from badly rotted tubers contaminated with soft rot bacteria was facilitated by using a medium consisting of Burkholder's agar medium (E. S. R., 80, p. 209), together with potassium dichromate at from 1:9,000 to 1:15,000 dilution. The two parts were sterilized separately and then mixed before pouring into plates containing a drop of heavy aqueous suspension of the yellowish exudate from the lesion. Incubation at 22° C. for 7–9 days yielded colonies which could be isolated by the usual methods.

The present status of bacterial ring-rot, J. E. LIVINGSTON. (Univ. Nebr.). (*Nebr. Potato Impr. Assoc. Ann. Rpt., 23 (1942), pp. 9–12*).—On the potato disease due to *Phytomonas sepedonica*.

Some relationships between potato yellow-dwarf virus and the clover leaf hopper, L. M. BLACK (*Phytopathology, 33 (1943), No. 5, pp. 363–371*).—*Aceratagallia sanguinolenta* nymphs in the third, fourth, and fifth instars transmitted this virus (*Marmor vastans vulgare*). No significant difference in mortality between infective and noninfective insects was observed. The minimum incubation period of the virus in the insect was 6 days, but longer ones were common. Insects fed on rye for 52 days were still infective, but the virus failed to pass from parents to progeny. A single insect may infect one crimson clover seedling daily for at least 10 days, but as many as 25 days may elapse between two transmissions by the same insect. The incubation period of the virus in crimson clover varied, but the majority developed symptoms in the second and third weeks after inoculation.

Sugar-beet yellows virus: A preliminary account of experiments and observations on its effect in the field, M. A. WATSON (*Ann. Appl. Biol., 29 (1942), No. 4, pp. 358–365, illus. 12*).—Though curly top does not occur in Great Britain, yellows is present and underestimated as a potential danger. The field symptoms vary with climatic and cultural conditions. In experiments, early infection on late-sown beets caused a loss of 67 percent of the root and 71 percent of the sugar yield, but the losses decreased with later infection and earlier sowing. The main source of infection and overwintering appears to be the sugar beet seed crop. Proximity of the seed crop to the root crop determines the number of viruliferous migrant aphids which enter the root crop at the initial infestation, and subsequent spread in the root crop is determined by the rate of reproduction and movement of the apterous aphids. Reproduction is more rapid on late- than on early-sown beets and seemed to be increased by poor plant nutrition.

Thiosan (tetramethyl thiuramdisulfide) and scurf control of sweet potatoes, R. H. DAINES. (N. J. Expt. Stas.). (*Phytopathology, 33 (1943), No. 5, pp. 410–412*).—In tests with Semesan Bel, Thiosan, and Spergon (wettable grade) as sprout-treating materials against sweetpotato scurf (*Monilochaetes infuscans*), Thiosan gave control equal to Semesan Bel and produced no visible sprout injuries. Sprouts planted within 15 min. after a Semesan Bel dip were injured less by the treatment than were those held 4 hr. before planting. The delay in planting also increased the control efficiency. Spergon gave only moderate control.

Observations on Cercospora leaf spot of tobacco and the question of varietal resistance, R. A. MCLEAN (*Phytopathology, 33 (1943), No. 5, pp. 354–362, illus. 2*).—Field and culture studies were made at Oxford, N. C., of a leaf spot on 30 varieties of flue-cured tobacco, found due to *C. nicotianae*, and counts of spots at various leaf levels, meteorological records, and descriptions of spots are presented. These data indicate the extent to which prevailing weather conditions may modify the macroscopic appearance of this disease. In critically evaluating the factors which might account for apparent differences in susceptibility, the necessity for careful scrutiny of the indications of varietal differences in resistance is stressed. Evidence is presented to show that the apparent differences in susceptibility of two varieties were probably due to the earlier ripening of the lower leaves of one rather than to any specific resistance. In all varieties the uppermost leaves showed definite spotting but markedly less than the lower ones, and in all of them a progressively higher count per leaf was noted the lower its position on the stalk.

Derivatives of tobacco mosaic virus, II–IV (*Jour. Biol. Chem., 146 (1942), No. 2, pp. 331–338, illus. 2; pp. 339–344; 345–350, illus. 1*).—Three papers are presented in continuation of the series (E. S. R., 87, p. 77):

II. *Carbobenzoxy, p-chlorobenzoyl, and benzenesulfonyl virus*, G. L. Miller and W. M. Stanley.—These three derivatives were prepared and demonstrated by electrophoretic measurements to contain less than 5 percent of unaltered virus as a contaminant. Measurements of specific virus activity on leaves of *Nicotiana glutinosa* indicated that about 70 percent of the amino groups of the virus could be substituted without loss of infectivity, but further reaction was accompanied by inactivation. In general, 10–20 percent of the phenol plus indole groups could be substituted without a decrease in infectivity. Tested on bean leaves, a number of the derivatives exhibited a significantly lower specific activity than on *N. glutinosa* leaves. When samples of each of the derivatives were inoculated into Turkish tobacco plants and allowed to propagate, normal virus was formed. The results as a whole confirmed those previously obtained with the acetyl and phenylureido derivatives. It was thus concluded that the nature of the substituent chemical radicals had rather little specific effect on the physiological behavior of the derivatives.

III. *The rôle of denaturation of the virus in the measurement of phenolic groups*, G. L. Miller.—The chromogenic power of preparations of tobacco mosaic virus toward the phenol reagent was found to depend on the completeness of denaturation. Furthermore, different preparations of the virus or of its artificially prepared derivatives were observed to exhibit different rates of denaturation. With sodium dodecyl sulfate as the denaturing agent, conditions were worked out which assured a uniform denaturation. The application of these findings to the measurement of phenol plus indole groups in the virus derivatives is described and comparisons are made with results obtained by the methods formerly employed.

IV. *A study of the determination of phenol groups in virus derivatives by means of model experiments with derivatives of tyrosine*, G. L. Miller.—The carbobenzoxy, *p*-chlorobenzoyl, and benzenesulfonyl derivatives gave a less complete recovery of chromogenic power under the usual conditions of the pH 11 method of Herriott than did the acetyl derivative. With model experiments on the corresponding derivatives of tyrosine, it was demonstrated that the different substituent radicals on the phenolic group vary considerably in their saponification rates. Application of these findings to the measurement of phenolic groups in derivatives of tobacco mosaic virus are discussed. The phenylureido derivative was found to yield more color in the pH 11 method than did normal virus. In studies on the chromogenic power of pure aniline and on the behavior of N-phenylcarbamido and O,N-diphenylcarbamido derivatives of tyrosine, this result was demonstrated to be due to the formation of aniline during treatment at pH 11. With the phenol color reagent, monosubstituted tyrosine derivatives yielded less color than did free tyrosine. An analogy is pointed out between this property of known derivatives of tyrosine and the similar low chromogenic power of tyrosine when present in protein linkage.

The sulfur distribution in the rib-grass strain of tobacco mosaic virus, C. A. KNIGHT (*Jour. Biol. Chem.. 147 (1943), No. 3, pp. 663–666*).—Analysis of the ribgrass (plantain) virus indicated that it contains about 0.62 percent of S or about three times that found in ordinary tobacco mosaic virus. The cysteine content of the ribgrass strain was apparently the same as in the ordinary strain (about 0.68 percent), but quantitative analyses by two methods indicated the presence of about 2 percent of methionine and qualitative tests showed that the ribgrass virus is the only one of eight strains containing this substance. All or essentially all of the S of the ribgrass virus is accounted for in the cysteine and methionine contents.

Resistance in the genus Nicotiana to Phytophthora parasitica Dastur var. nicotianae Tucker, H. H. FOSTER (*Phytopathology 33 (1943), No. 5, pp. 403–404*).—Thirteen species, including several strains and varieties of tobacco, were tested for resistance to black shank in the greenhouse. Under the severe conditions none proved immune, but two commercial tobacco varieties, Virginia No. 9 and Utuado X No. 1, showed some degree of resistance in the field and three additional species, *N. rustica*, *N. longiflora*, and *N. repanda*, exhibited definite resistance. In the last the resistance appeared to be located primarily in the roots. Attempts to cross this species with tobacco were only partially successful.

Diseases of some vegetable and fruit crops and their control, A. G. PLAKIDAS. (*Louisiana Sta. Bul. 357 (1943), pp. 92, illus. 32*).—A handbook on fruit and vegetable diseases and their control, with special reference to southern conditions and including a general section on some methods and materials used in seed treatments, sprays, and dusts.

Development of Penicillium on the cut surfaces of certain vegetables, W. A. R. DILLON WESTON and R. E. TAYLOR (*Nature [London], 151 (1943), No. 3819, pp. 54–55*).—A preliminary note reporting copious development of *Penicillium* on cut surfaces of several vegetables previously treated with 2.5-percent solution of $CuSO_4$ and kept moist, but none on similar untreated surfaces. Other salts of Cu and Co gave similar results, Ni and Fe salts less marked results, and several other metallic salts none.

A summary of vegetable seed treatments, G. L. MCNEW. (N. Y. Sate Expt. Sta.). (*Canner, 96 (1943), No. 23, pp. 14–15*).

A mosaic disease of broccoli, J. CALDWELL and I. W. PRENTICE (*Ann. Appl. Biol., 29 (1942), No. 4, pp. 366–373, illus. 6*).—The symptoms of this mosaic, prevalent in southwestern England, consist of vein-clearing followed by vein-banding and necrotic spotting, and in extreme cases by dwarfing of the plant. Symptoms on other cultivated Brassicae are less severe. The field vector is the cabbage aphid (*Brevicoryne brassicae*). The virus is also transmissible by juice inoculation with an abrasive. It resists aging in vitro for 7 days at 22° C. and is inactivated by heating to 80° for 10 min. or by dilution to less than 1:2,000. The similarity of host range, vector, and properties indicate the virus to be identical with that of Tompkins' cauliflower mosaic (E. S. R., 77, p. 801). This is believed to be the first crucifer virus occurring in Great Britain to be fully described.

The spread and effect of broccoli mosaic in the field, J. CALDWELL and I. W. PRENTICE (*Ann. Appl. Biol., 29 (1942), No. 4, pp. 374–379, illus. 4*).—The spread and effect of mosaic were studied by plotting on squared paper all the plants in large field blocks, followed by surveys for infected plants at regular intervals.

It is concluded from the results that proximity of the seedbed to hedgerow plants increases the chances for infection and that the seedbed should be located in the middle of the field as far away as possible from the hedges. Since early-infected plants serve as foci of infection, roguing early in the season is advocated. Spraying had little effect in controlling severe aphid infestation unless done very often and at considerable expense.

The epidemiology and control of downy mildew on hops, R. O. Magie (*New York State Sta. Tech. Bul. 267 (1942), pp. 48, illus. 11*).—Downy mildew (*Pseudoperonospora humuli*) being the most destructive disease of hops in New York, its economic control is a prime requisite to successful production. This study was conducted to gain a better understanding of the various environal relations of the fungus and of the disease which it causes, in order to facilitate the development of better control measures. The principal conclusions follow: The fungus attacks all plant parts except the roots, young tissues being very susceptible and often systemically invaded. The killing of stems, blossoms, and cones greatly reduces the yield and quality of the crop. No other host is known in the State, and the fungus overwinters in the soil as oospores produced in diseased parts throughout the growing season. Sporangia are also produced throughout the season during nights of high humidity. Both these spore forms germinate into zoosporangia, which infect the plant when water is present for at least 2 hr. Temperatures of 13°–18° C. are best for sporulation, germination, and infection, and such temperatures, combined with frequent rains, dews, and fogs, provide an ideal environment for rapid increase in the disease. Control on susceptible varieties even in the most epidemic years can be economically effected by sanitation and thorough spraying with bordeaux (6–4–100) or Yellow Cuprocide (1.5–100), which proved most effective of the materials tested. These should be applied when the vines are about 8 ft. high, 2 weeks later, at the start of the bur period, and at the start of cone formation. In valley plantings more frequent applications, including an earlier spraying, are needed. Dusting two to three times during August with copper-lime (25–75) or Cuprocide-sulfur (7–93) is necessary to protect the cones if any new spikes or diseased leaves are present at that time. There are 60 references.

Verticillium wilt of the hop (Humulus lupulus), W. G. Keyworth (*Ann. Appl. Biol., 29 (1942), No. 4, pp. 346–357, illus. 8*).—Study of the wilt of hops, due mainly to *V. albo-atrum* but occasionally to *V. dahliae*, indicated that outbreaks vary widely in severity and persistence, some fluctuating in intensity from year to year and others becoming progressively more extensive. Early observations on the progressive type suggested that infection was being spread during cultivation processes. Experimental work (1939–41) supported this view and showed diseased leaves and stems to be important in its spread, as well as the planting of diseased cuttings. Infection in hops has been found on some farms to be related to the growing of either potatoes or raspberries. Soil disinfection tests have shown 2 percent formalin to be promising when applied at the rate of 8 gal. per square yard. Recommended control measures which have been formulated consist mainly in sanitation practices designed to remove inoculum sources.

Note on the occurrence of Pythium mamillatum Meurs in Britain, H. Duerden (*Brit. Mycol. Soc. Trans., 26 (1943), pt. 1–2, p. 15*).—Reported as parasitizing mustard seedlings.

Seed treatment aids against pea root rot if disease is not too concentrated in soil, J. L. Forsberg (*Colo. Farm Bul. [Colorado Sta.], 5 (1943), No. 2, pp. 5–8, illus. 2*).—Considerable damage by root rot diseases has been experienced in Colorado for many years. It was found that three groups of fungi are mainly responsible in this State, viz, *Fusarium*, *Rhizoctonia*, and *Pythium*. *F. martii pisi* is probably the most serious. When a certain type of *Fusarium* was added to the soil, peas planted therein produced plants with swollen distorted lower stems and the roots were rotted off. Control of such diseases is difficult because the fungi may live in the soil indefinitely but tend to become reduced if peas are not grown in such soil for several years, 3–5 yr. being the minimum where the disease has been severe. Under certain conditions seed treatments have proved effective in preventing a great deal of the seed-rotting and seedling-blight stages of these diseases, probably by warding off attacks through the protective chemical covering of the seed until germination occurs and the young plant becomes established. Unless the soil infestation is severe, seed treatment is likely to enable plants to get a good start so that a fairly satisfactory crop may be obtained in spite of the root rot which may develop later.

New treatments for spinach seed show promise, G. L. McNew. (N. Y. State Expt. Sta.). (*Farm Res.* [*New York State and Cornell Stas.*], *9* (*1943*), *No. 2*, *pp. 11–13*, *illus. 2*).—Although the results of a single season's tests (1942) must be considered as preliminary, they were deemed sufficiently promising to warrant report. The new spinach seed disinfectants showing up best were Spergon, copper oxychloride-sulfate, Yellow Cuprocide, and Arasan, all having given results as good as or better than Red Cuprocide or zinc oxide. In case the standard treatments are not readily available substitutes may soon be needed, and even if supplies are adequate it is suggested that some of the new materials be tested on a few rows to determine their adaptability to different soils and other conditions.

Stem rot on outdoor tomatoes, T. Small (*Agriculture, Jour. Min. Agr.* [*Gt. Brit.*], *50* (*1943*), *No. 2*, *pp. 64–67*).—Stem rot due to *Didymella lycopersici* is said to have been rather rare in England, but with the extension of tomato growing in the open it was reported from several counties in 1942. The author summarizes his experiences and studies of the disease on the island of Jersey prior to June 1940 with respect to the chief losses due to primary infections; and the sources of inoculum from diseased fruit and seed, propagating and field soils, the water bath for soaking the soil in seedling flats, and plant supports. Recommendations for control are presented.

Tomato varieties and the timing of spray schedules, J. D. Wilson (*Ohio Sta. Bimo. Bul. 221* (*1943*), *pp. 75–82*, *illus. 6*).—Spray schedules beginning July 10 for the early and ending August 10 for the late varieties not having given sufficient protection under Ohio conditions, a spray test (1942) on five varieties with different maturity dates was carried out to determine the relation between timing and leaf spot defoliation. Detailed data for each variety are given. The average plant condition for all varieties throughout the season was best for the schedule beginning July 2 and ending August 19, as well as the largest quantity and highest grade of fruit. Spraying delayed the production of ripe fruits considerably, the greatest delay being on the earliest schedule (June 20). Blossom-end rot was more common in fruits on plants where the spray schedule started June 20 or July 2 than in those from untreated plats, but this disease was least common in plants given the two latest-starting schedules (July 14 and 26).

Fruit disease situation in 1942, H. C. Young. (Ohio Expt. Sta.). (*Ohio State Hort. Soc. Proc.*, *76* (*1943*), *pp. 12–17*).—Seasonal notes for apple diseases and virus diseases of stone fruits in Ohio.

Fruit crop disease control under war emergency conditions, H. W. Anderson and D. Powell. (Univ. Ill.). (*Ill. State Hort. Soc. Trans.*, *76* (*1942*), *pp. 302–310*).—A general discussion, with special reference to spray schedules and conservation of scarce fungicidal materials.

Advisability of modified fruit disease control practices under war conditions, C. C. Allison. (Ohio State Univ.). (*Ohio State Hort. Soc. Proc., 76 (1943), pp. 18–20*).

Water core in Illinois apples, D. S. Brown. (Univ. Ill.). (*Ill. State Hort. Soc. Trans., 76 (1942), pp. 407–412*).—A preliminary report on studies begun in 1942.

Control of apple diseases in northern Illinois, D. Powell. (Univ. Ill.). (*Ill. State Hort. Soc. Trans., 76 (1942), pp. 345–350*).—A spray schedule found efficient for local conditions is presented and discussed.

Experiments with eradicant sprays in the control of apple blotch and bitter rot, D. Powell and H. W. Anderson. (Univ. Ill.). (*Ill. State Hort. Soc. Trans., 76 (1942), pp. 440–449*).—After reviewing facts brought out by workers in the past, the authors present 1942 data from which it seems clear that bordeaux 12–8–100 with Dendrol 2 percent and bordeaux 6–4–100 with Dendrol 1 percent greatly suppressed the initial blotch inoculum. It is apparent that eradicant sprays alone will not give satisfactory control but must be supplemented by the regular summer sprays, unless after at least 4 yr. of the double treatments canker development has been reduced to a point where the eradicant sprays may be relied upon. There was no evidence from the 1942 results that bitter rot inoculum could be reduced by eradicant dormant sprays.

Variables to consider in the control of stone fruit diseases, H. W. Anderson. (Univ. Ill.). (*Ill. State Hort. Soc. Trans., 76 (1942), pp. 431–439*).—Peach leaf curl, scab, and brown rot and cherry leaf spot are discussed.

A destructive virus disease of sour cherry, G. W. Keitt and C. N. Clayton. (Wis. Expt. Sta.). (*Phytopathology, 33 (1943), No. 6, pp. 449–468, illus. 9*).—Trees affected with this virus disease, tentatively called cherry yellows, tend to have relatively large leaves, some of which develop conspicuous chlorotic areas. These chlorotic leaves, as well as some that are still green, become abscised, and a major defoliation usually occurs about 3–4 weeks after petal fall. Affected trees probably live nearly as long as normal ones but tend to have fewer spurs and sparse crops. Reciprocal budding tests between diseased and healthy trees resulted in transmission wherever union of tissues was observed. The virus was also transferred by budding from *P. cerasus* to *P. mahaleb* and back to *P. cerasus*, though it was uncertain whether the chlorotic symptoms incited on *P. mahaleb* were attributable to the yellows virus. Limited transmission tests with other *Prunus* species are reported. Records of incidence of moderately or severely diseased trees (1936–40) in 5 orchards containing 2,593 trees showed an annual increase averaging 3 percent. In 1940 the percentage of such diseased trees in 18 orchards containing 6,588 trees was 10.7. Montmorency and Early Richmond, the varieties dealt with, appeared to be equally susceptible. Preliminary experiments gave strong evidence that the disease may be transmitted by leafhoppers, but similar tests with the black cherry aphid (*Myzus cerasi*) were negative.

The yellow-red virosis of peach: Its identification and control, D. H. Palmiter and E. M. Hildebrand (*New York State Sta. Bul. 704 (1943), pp. 17, illus. 3*).—After a disease survey of the Hudson Valley in 1938 revealed the presence of this disease, the station and Cornell University initiated joint studies to determine its cause, nature, and control. This account (with color plate) presents the results of this work, including the necessary information to enable fruit growers to recognize the disease in their orchards as well as on the wild hosts, to understand the virus nature of the infection, to acquaint themselves with the serious damage resulting from neglect of preventive measures, and to present data on methods of eradication, use of resistant varieties, and regulatory measures for protecting nursery stock.

Tests of eradicant sprays for use against Sclerotinia laxa and Coryneum beijerinckii in apricots and almonds, E. E. Wilson. (Univ. Calif.). (*Phytopathology, 33 (1943), No. 6, pp. 506–516, illus. 3*).—Of 41 materials tested for eradication of the hold-over (conidial) stage of *S. laxa*, sodium dinitro-*o*-cresylate, sodium tetrachloro-phenate, and sodium pentachloro-phenate showed some promise. Although 0.5-percent solutions of the cresylate and 1-percent solutions of the two phenates failed to kill the mycelium within tissues of diseased twigs, and were thus ineffective in preventing further conidial production thereon, they did under certain conditions destroy a large proportion of the conidia on sporodochia present at the time of application. These materials also proved capable of killing the conidia of *C. beijerinckii* produced within diseased buds, but were ineffective in preventing further conidial development. Apparently, therefore, these materials failed to destroy the mycelium within tissues of diseased twigs and buds.

Blister rust relations of cultivated species of red currants, G. G. Hahn. (U. S. D. A. et al.). (*Phytopathology, 33 (1943), No. 5, pp. 341–353*).—In considering the origin and blister rust relations of four hybrid groups of the common red currant of the garden, inoculation tests with *Cronartium ribicola* are described as demonstrating the immunity of the old variety Red Dutch (Holländische Rote). A preliminary report is also made on the insignificant telium production on leaves of the scant number of selfed-seedling suscepts of the nearly homozygous rust-immune Viking. Both European varieties belong to a small *Ribes petraeum* group, which includes other immune or highly resistant forms. In contrast, the varieties originating from *R. rubrum* showed but scant susceptibility, and those derived from *R. sativum* and its variety *macrocarpum* were the most susceptible for red currants as a whole. However, the last two groups, even when infected under the most favorable conditions, can be regarded as only fair hosts for blister rust as compared with most native *Ribes* spp. and *R. nigrum*. The author indicates that the volume of telium and sporidium production on *R. sativum*, and particularly on "escapes," is significant in determining the actual amount of damage to white pine attributable solely to infection from red currants. Moreover, necrosis of infected areas and early defoliation, characteristic of *R. sativum*, have a very definite relation to telial viability and the volume of sporidial production. These phases of the red currant problem need further study.

Gloeosporium pestiferum, a synonym of Elsinoe ampelina, A. E. Jenkins. (U. S. D. A.). (*Brit. Mycol. Soc. Trans., 26 (1943), pt. 1–2, pp. 50–52, illus. 1*).—A taxonomic note on the grape anthrocnose fungus.

The possible relation of injury and death of small roots to decline and collapse of citrus and avocado, L. J. Klotz and V. P. Sokoloff (*Calif. Citrog., 28 (1943), No. 4, pp. 86–87, illus. 6*).—See also a previous note (E. S. R., 89, p. 88).

Physiological disturbance in leaf causes mesophyll collapse, V. P. Sokoloff, L. J. Klotz, and F. M. Turrell. (Calif. Citrus Expt. Sta.). (*Citrus Leaves, 23 (1943), No. 3, pp. 8–10, illus. 4*).—From the data presented and in the present state of knowledge, the authors are inclined to consider the discolored translucent sunken areas in citrus leaves known as "mesophyll collapse" a purely physiological disturbance caused by an "unbalance" in the distribution of Ca, Mg, K, and Na ions between the aqueous and the solid phases of the leaf tissue. While the prime causes responsible for the cation disturbance in the leaf tissues remain obscure, the association of the mesophyll collapse with this cation unbalance is regarded as established. A condition apparently identical with the spontaneous collapse was induced by water-logging 3-year-old orange plants in tap water containing milliequivalents of $MgSO_4$ per liter. The effect appeared to be specific, since the NH_4, Ca, and other salts tried failed to induce the true mesophyll collapse.

Convex gum, a new disease of citrus in China, Kung-Hsiang Lin (*Phytopathology, 33 (1943), No. 5, pp. 394–397, illus. 1*).—This new disease, observed in southern China, is characterized by bark swellings and gum formation on trunk, limbs, and twigs, principally on young trees. There are two types. In one, bark swellings average about 2.5 cm. in diameter; gum is formed in pockets in the wood and may break through the bark to form cankerlike lesions. In the other type, bark swellings average about 1 cm. in diameter, and gum appears as small flecks in the bark. The disease is believed due to a virus, probably related to that of psorosis.

Observações sobre a "tristeza" dos citrus, ou "podridão das radicelas" [Observations on citrus root rot], S. Moreira (*Biológico, 8 (1942), No. 11, pp. 269–272*).

Influence of plant populations upon incidence of pineapple yellow spot, M. B. Linford. (Univ. Hawaii). (*Phytopathology, 33 (1943), No. 5, pp. 408–410*).—The data presented support the hypothesis that infective thrips, blown in from a distance, were scattered almost uniformly over the experimental planting, resulting in approximately equal numbers of virus infections per unit area but in percentages of infection that were lower as the density of the plant population increased. Thus plats with plants 18 in. apart, having only two-thirds as many plants per unit area as plats with 12-in. spacing, would be expected to have 50 percent more infections, a figure which was reasonably close to the observed value.

An Alternaria disease of zinnia, A. W. Dimock and J. H. Osborn. (Cornell Univ.). (*Phytopathology, 33 (1943), No. 5, pp. 372–381, illus. 3*).—A disease of garden zinnia (*Zinnia elegans*), causing spotting of the petals, leaves, and stems and rotting of the roots, has been under observation at Cornell University since 1934 and found due to *A. zinniae*. The optimum temperature for growth of the fungus in culture was about 81° F.; that for leaf infection about 70°. An incubation period of approximately 24 hr. was required for maximum development of leaf infection. Invasion occurred most readily through the lower leaf surface. Evidence is given that the pathogen may be seed-borne and may survive at least one winter in or on the soil. Data on its geographical distribution are included.

Effects of extract of western red-cedar heartwood on certain wood-decaying fungi in culture, C. M. Southam and J. Ehrlich. (Univ. Idaho). (*Phytopathology, 33 (1943), No. 6, pp. 517–524, illus. 1*).—The hot-water-soluble extractives of the heartwood of *Thuja plicata* were removed at 100° C. from sawdust and mixed in various concentrations with malt-agar medium, on which were tested *Coniophora puteana, Fomes officinalis, F. pinicola, F. roseus, Lentinus lepideus*, "Madison 517" (*Polyporus tulipiferus?*), *P. schweinitzii, P. sulphureus, Poria xantha* f. *crassa, Trametes serialis*, and *T. subrosea*. Extreme dilutions were stimulatory, at least to some of the fungi, the degree decreasing with age of culture. Any considerable concentration of the extract was fungistatic and, if high enough, lethal, the degree of fungistasis here also decreasing with age of culture. Many of the fungi became adapted to normally lethal dosages when grown on successively higher concentrations of the extract, and at least some of them secreted metabolic products that decolorized the surrounding medium and apparently overcame its toxicity.

Diplodia blight in coniferous seedbeds, C. M. Slagg and E. Wright. (U. S. D. A. and Kans. Expt. Sta.). (*Phytopathology, 33 (1943), No. 5, pp. 390–393*).—First-year seedlings of *Pinus nigra, P. edulis, P. ponderosa*, and

Pseudotsuga taxifolia in nursery beds at Manhattan, Kans. (1941), were severely blighted by a fungus identified as *D. Pinea.* It also caused dieback in mature trees of the above-named and several other species of two- and three-needle pines at Manhattan (1941–42). Pure culture inoculations proved the fungus highly pathogenic to young uninjured pine seedlings.

Leaf spot on Terminalia arjuna, A. E. Jenkins. (U. S. D A.). (*Phytopathology, 33 (1943), No. 5, pp. 404–405, illus. 1*).—A destructive leaf spot of *T. arjuna* was found at Coconut Grove, Fla. Pycnidia of the nature of *Phyllosticta* were present on the spots, and among the organisms isolated was *Phomopsis* sp., as well as *Pestalotia disseminata.*

Sphaceloma on willow in New Zealand, A. E. Jenkins and L. Grodsinsky. (U. S. D. A. et al.). (*Brit. Mycol. Soc. Trans., 26 (1943), pt. 1–2, pp. 1–3, illus. 1*).—*S. murrayae* n. sp., causing "gray scab" on leaves of *Salix fragilis* and *S. babylonica,* is described.

Tree experts' code, L. R. Tehon (*Amer. Nurseryman, 77 (1943), No. 5, pp. 26, 27*).—One of the functions of the New Jersey Society of Certified Tree Experts has been that of establishing a code of standards governing work of this kind in the State, including phases concerned with diseases and insects such as codes for cavity work and spraying. These standards are here summarized.

ECONOMIC ZOOLOGY—ENTOMOLOGY

Problems of ageing: Biological and medical aspects, edited by E. V. Cowdry (*Baltimore: Williams & Wilkins Co., 1942, 2, ed., pp. 936+, illus. 129*).—Included in this work (E. S. R., 82, p. 421) of 34 chapters by 37 authors, each of which includes a copious bibliography, are chapters by H. S. Jennings on Senescence and Death in Protozoa and Invertebrates (pp. 29–48), L. O. Howard on Ageing of Insects (pp. 49–65), and T. W. Todd on Ageing of Vertebrates (pp. 66–76).

Suggestions for reducing crop damage by wildlife, A. S. Einarsen (*Oregon Sta. Cir. 148 (1943), pp. 8, illus. 4*).—Information is brought together in practical form relating to the protection of agricultural crops from pheasants and rodents, including squirrels, pocket gophers, field mice, and others, which have been destructive to certain crops in certain seasons in Oregon.

Forage consumption and preferences of experimentally fed Arizona and antelope jack rabbits, J. F. Arnold (*Arizona Sta. Tech. Bul. 98 (1942), pp. 51–86+, illus. 5*).—In experimental work the Arizona jack rabbit (*Lepus californicus eremicus*) and the antelope jack rabbit (*L. alleni alleni*), common to southern Arizona, were fed in captivity over a period of 3 yr. to determine their consumption of and preferences for a large number of range plants in the vicinity. They "were determined by means of hand-feeding trials in specially designed enclosures and by measurements of grazing on artificially established forage plats. The average daily forage consumption of Arizona jack rabbits was found to be 0.23±0.01 lb. of alfalfa hay (leaves) and rolled barley, 0.28±0.01 lb. of air-dry native forage, and 0.27±0.02 lb. of green forage in terms of air-dry material. When absolute forage consumption is expressed as a percentage of live weight, these rations are equal to 5.6 percent, 6.5 percent, and 6.7 percent of body weight, respectively. The average daily forage consumption of antelope jack rabbits was found to be 0.28±0.01 lb. of alfalfa hay and barley, 0.37±0.02 lb. of air-dry native forage, and 0.38±0.02 lb. of green forage expressed as air-dry material. In terms of percentage of live weight, these amounts are 5.8 percent, 6.1 percent, and 6.5 percent, respectively. Palatability tests were made with 32 species of grasses, 47 weed species, and 21 kinds of browse. When each kind of forage is offered in excess, jack rabbits appear to prefer plants in the order of weeds, grasses, and browse with the first two making up the major and about equal parts of the diet. The equal proportion of weeds and grass in the diet offers an explanation as to why rabbits are more abundant on overgrazed than on normal ranges. It is also suggested that once deterioration is well under way rabbits may be a partial cause of overgrazing, and in the final stages of deterioration they may be the primary cause of depletion. On the basis of available data, jack rabbit grazing pressure can be visualized in terms of cows as follows: When competition is considered to be direct, 62±7 Arizona rabbits consume the equivalent of a 1,000-lb. range cow, while 48±2 antelope rabbits consume the same equivalent. When the two classes of animals are considered to compete only for perennial grasses, the equivalents become 260±20 for the Arizona rabbits and 164±7 for the antelope jacks."

Voles, mice, and lemmings: Problems in population dynamics, C. Elton (*London and New York: Oxford Univ. Press, 1942, pp. 496+, illus. 23*).—The four parts in which this work is presented are: 1, Vole and mouse plagues (pp. 1–125), 2, fluctuations in northwest Europe (pp. 126–233), 3, wildlife cycles in northern Labrador (pp. 234–338), and 4, wildlife cycles in Ungava (pp. 339–484).

Some of the latest developments in the control of rats and mice, F. E. Garlough (*Pests, 11 (1943), No. 1, pp. 6–7, 9*).

Wild ducks (*Washington, D. C.: Amer. Wildlife Inst., [1941], pp. 35+, illus. 34*).—This practical contribution, with a foreword by I. N. Gabrielson, an account of North American wild ducks by H. P. Sheldon, and a discussion of waterfowl highways by F. C. Lincoln, is illustrated by F. Everett. The plumage of both sexes of 16 species appears in colors in as many plates, together with inset descriptions and maps which show both the breeding and winter ranges of each.

Food habits of quail, W. R. DeGarmo (*W. Va. Conserv., 7 (1943), No. 2, pp. 10, 17–18*).—Identifications of the more important plants found in the crops of 98 quail collected from hunters throughout Jackson County, W. Va., over the period from November 11 to December 19, 1942, are reported upon. It is pointed out that while the information obtained is limited it gives some indication of feeding habits for that period of the year.

Poisonous reptiles of the world: A wartime handbook, D. M. Cochran (*Smithsn. Inst., War Background Studies, No. 10 (1943), pp. 37+, illus. 34*).

Brook trout in Kettle Creek and tributaries, R. L. Watts, G. L. Trembley, and G. W. Harvey (*Pennsylvania Sta. Bul. 437 (1942), pp. 41+, illus. 21*).—Report is made of studies conducted to determine (1) feeding habits of brook trout and the available food supply in the streams under observation, (2) their migratory movements in these streams and the relationship of temperatures to such movements, and (3) their growth rate in small nursery streams closed to public fishing and also in the important tributary of Kettle Creek, Hammersley Fork, all of which is open to public fishing, and (4) to obtain as much information as possible which would be useful in planning stream management programs.

It was found that spawning occurs in October and the first part of November. "An incomplete fishermen's creel census taken in 1941 gave unmistakable evidence of the importance of natural propagation in Hammersley Fork, for 2,348 native brook trout were captured by fishermen from April 17 to June 20. From April 17 to June 2, 1,034 trout caught by fishermen averaged 7.31 in. in length. Practically all of the fish of legal size stocked in Kettle Creek are caught before they have a chance to migrate up the tributaries. The upstream migration in May becomes most active when water temperatures are over 60° F. and when rains cause at least some rise in the streams. The downstream fall migration, which is much less than is generaly supposed, occurs soon after spawning and particularly when there is a rise of water. There is very little movement of brook trout from one small tributary to another, but there is considerable short distance movement between pools. Brook trout over 4 in. long grow at the rate of slightly over an inch a year in the Dr. Green Branch, well over an inch in Hevner's Run, and approximately 2 in. in Trout Run and Hammersley Fork and its tributaries, the Bell and Nelson Branches. Stream management is essential to the maximum production of trout in this watershed regardless of the fact that most of these streams possess many natural advantages."

Insect behavior to various wave lengths of light. H. B. Weiss, F. A. Soraci, and E. E. McCoy, Jr. (*Jour. N. Y. Ent. Soc., 51 (1943), No. 2, pp. 117–131, illus. 7*).—This, the fourth of a series (E. S. R., 87, p. 392) relating to the group behavior of certain insects to light of various wave lengths, reports the results of additional tests made in 1942 in the sector type equipment, which is fully described in the preceding contribution.

Color perception in insects, H. B. Weiss (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 1–17*).—In reporting further (see above) the author reviews the status of knowledge of color perception in insects and includes a list of 84 references to the literature cited.

An apparatus for testing chemotropic responses of flying insects, L. Ingle. (Univ. Ill.). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 108–110, illus. 1*).—Description is given of an apparatus which employs the use of blue light to attract houseflies or stableflies to screens for the purpose of testing their response to different substances present on one of the screens. Subjection of flies directly to the test materials present in the state in which they would be used in field tests evokes response which represents a summation of the organism's receptor system. The apparatus is simple in construction, easily used, and gives a fair picture of the effectiveness of any given material as a repellent or an attractant. Response to odors can also be tested with the apparatus.

[Notes on economic insects and their control] (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 111–127, illus. 3*).—Contributions presented (E. S. R., 88, p. 783) are: Toxicity of Some Nitroparaffins to the Confused Flour Beetle, by H. H. Richardson, M. S. Schechter, and H. L. Haller (p. 111), Volatile Fluorine Compounds as Insecticides, by R. C. Roark (pp. 111–112), Damage to Strawberry Fruit by Small Darkling Beetles (*Blapstinus* spp.), by J. Wilcox and A. F. Howland (p. 116), Acrylonitrile and Trichloroacetonitrile in Admixture With Carbon Tetrachloride as Possible Fumigants for Stored Grain, by R. T. Cotton and H. D. Young (pp. 116–117), Influence of Changes in Relative Humidity on the Effect of Certain Insecticides on Newly Hatched Codling Moth Larvae, by L. F. Steiner and C. H. Arnold (pp. 117–118), Influence of Moth-Trapping Methods on the Proportion of Females in the Catches, by D. F. Barnes (pp. 119–120), The Collection, Rearing, and Release of Parasites of the European Corn Borer in 1942 by C. A. Clark and S. W. Carter (p. 120), Injury to Leaves of Sweet Corn by the Leafhopper *Dikraneura carneola* (Stal), by G. W. Barber (p. 123), Survival Periods for Eggs of *Anastrepha ludens* (Loew) During Vapor-Heat Sterilization, by E. W. Baker (p. 124), and Some Fumigants of the Nitroparaffin Group, by H. D. Young and R. T. Cotton (p. 125) (all U. S. D. A.); A Combination of 2,4-dinitro-6-cyclohexylphenol With Sulfur as a Substitute for Pyrethrum for Control of Potato Leafhopper, by D. M. DeLong and G. L. McCall (pp. 112–113), and Some New Killing Fluids for Larvae of Insects, by A. Peterson (p. 115) (both Ohio State Univ.); A White Grub Injuring Peanuts in Eastern Virginia, by L. I. Miller (pp. 113–114), and The Abundance of *Microctonus epitricis* (Vier.) in Virginia, by G. Wene and C. B. Dominick (pp. 114–115) (both Va. Expt. Sta.); *Epitrimerus* *pyri* Nal. in New York (p. 116) and *Scolytus sulcatus* Lec. in Western New York (p. 119), both by L. L. Pechuman; The Occurrence of Physiological Races of the Pea Aphid, by C. D. Harrington (pp. 118–119); The Occurrence of the Potato Tuber Worm in Nebraska, by H. D. Tate (pp. 120–121) (Nebr. Sta.); Studies of the Flight Range of Mosquitoes, by J. L. Clarke (pp. 121–122); The Dried Fruit Moth Breeding in Nests of the Mountain Carpenter Bee [*Xylocopa orpifex* Smith] in California (pp. 122–123) and The Spelling of Scientific Names of Some Stored Food Products Pests (pp. 125–126), both by E. G. Linsley, and The Cork Oak Cynipid [*Plagiotrochus suberi* Weld] in California, by E. O. Essig (pp. 123–124) (all Univ. Calif.); A Gas-Tight Fabric for Fumigation Purposes, by H. J. Quayle and D. L. Lindgren (p. 125) (Calif. Citrus Sta.); The Freezing of Insects—A Criticism and Explanation, by R. W. Salt and G. A. Mail (pp. 126–127); and Horsefly Control Incidental to Mosquito Control, by H. O. Lund (p. 127).

[Contributions on applied entomology in Iowa] (*Iowa State Hort. Soc. [Rpt.], 76 (1941), pp. 263–280, 287–296, illus. 3*).—A Review of Research and Observations Concerning the Foulbrood Diseases of Honeybees (accompanied by 81 references to the literature), by N. Baker (pp. 263–273); and Morale in the Honeybee Colony, by O. W. Park (pp. 273–280), Some Potato Dusting Experiments in Iowa, by D. R. Lindsay (pp. 287–290), and The Sequoya Potato Resistant to Hopperburn, by D. R. Lindsay and A. T. Erwin (pp. 290–296) (all Iowa Expt. Sta.) are presented.

The eleventh annual insect population summary of Kansas, 1941, R. C. Smith. (Kans. Expt. Sta.). (*Kans. Acad. Sci. Trans., 45 (1942), pp. 203–220*).—A continuation of this annual summary (E. S. R., 88, p. 499).

A preliminary report on the insect orders found in various grassland habitats in the vicinity of Hays, Kansas, F. A. Branson (*Kans. Acad. Sci. Trans., 45 (1942), pp. 189–194, illus. 5*).—The results of work conducted at Hays in 1941 are reported.

The Canadian Insect Pest Review, [May 1, 1943] (*Canad. Insect Pest Rev., 21 (1943), No. 1, pp. 130+*).—Included in this number are: A Summary of the More Important Crop Pests in Canada in 1942, by T. R. Twinn (pp. 1–9); The Agricultural Season of 1942 in Canada (pp. 9–11); Insects of the Season 1942 by Provinces (pp. 11–103); The Principal Stored Product Insect Pests in Canada in 1942, by H. E. Gray (pp. 103–105); Plant Parasitic Nematodes in Canada in 1942, by A. D. Baker (p. 106); and Summary of Parasite and Predator Liberations in Canada in 1942 (pp. 107–130).

Place of research in the control of injurious insects, J. W. Munro (*Nature [London], 151 (1943), No. 3823, pp. 157–160*).

The effect of crowding upon the oviposition of grain-infesting insects, A. C. Crombie (*Jour. Expt. Biol., 19 (1942), No. 3, pp. 311–340, illus. 5*).—In the experiments reported, all were performed at 30° C. and a relative humidity of approximately 70 percent. It was found that the crowding of adults invariably had a depressing effect upon the rate of oviposition in the insects, while egg fertility was not affected. "In unconditioned media, at densities possible in actual populations, the reduction of fecundity was, it appears, entirely a result of competition for the oviposition sites usually for two purposes, viz, oviposition and feeding. That is to say, at such densities the effect of crowding upon oviposition was of a behavioristic nature. When two species were living in the same environment their mutual effect upon each other's fecundity was more or less dependent upon the degree of identity of the niches for which they were competing. The reduction of fecundity of *Rhizopertha* by homotypically and heterotypically conditioned media was at first roughly proportional to the degree of conditioning, but after a time the effect of all media was the same. Homo-

and hetero-typical conditioning were not radically different in effect. It is believed that conditioned medium operates upon fecundity through 'poisoning,' and that the effect is upon oviposition rather than, as that of starvation, upon egg production. When returned to an optimum environment the insects recovered from all the experimental conditions . . . immediately from conditions of overcrowding, more slowly from conditioned media, and more slowly still from complete starvation."

Comparative tests of certain insecticides and variations in schedules for cotton insect control, J. C. Gaines (Tex. Expt. Sta. coop. U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 79–81*).—In the first of two further experiments (E. S. R., 86, p. 66) calcium-zinc arsenate gave a little better control of bollworms than either calcium arsenate alone or calcium arsenate-rotenone mixture, but the difference was not significant. Calcium arsenate-rotenone prevented aphid increases better than calcium-zinc arsenate. The yields indicated that calcium arsenate-rotenone and calcium-zinc arsenate were equally effective and better than calcium arsenate alone. The higher yield recorded on the calcium arsenate-rotenone- and calcium zinc arsenate-treated plats was due to aphid control in the first case and slightly better bollworm control as well as retarding aphid increases at least 2 weeks in the latter.

In a second experiment alternate applications of calcium arsenate and lead arsenate, using two applications of lead arsenate during the peak of bollworm injury, gave good control of both weevils and bollworms. Losses in yields occurred when cryolite was used in this manner, because of the increased weevil injury. Two consecutive applications of either lead arsenate or cryolite at the peak of bollworm injury instead of calcium arsenate did not prove to be effective against the weevils, thus causing a loss in yield.

Lepidoptera, Hemiptera, and Homoptera associated with ironweed, Vernonia interior Small, in Kansas, R. B. Schwitzgebel and D. A. Wilbur. (Kans Expt. Sta.). (*Kans. Acad. Sci. Trans., 45 (1942), pp. 195–202*).—A report of additional insects associated with *V. interior* (E. S. R., 89, p. 97).

Fruit insect problems in 1942, J. A. Evans. (Cornell Univ.). (*N. Y. State Hort. Soc. Proc., 88 (1943), pp. 124–134*).

Suggestions on fruit insect control in wartime, C. R. Cutright and M. A. Vogel (*Ohio State Hort. Soc. Proc., 76 (1943), pp. 22–32*).

The influence of insects on the development of forest protection and forest management, F. C. Craighead. (U. S. D. A.). (*Smithsn. Inst. Ann. Rpt., 1941, pp. 367–392, pls. 12, figs. 2*).

Forest entomology in post-war rehabilitation, J. J. de Gryse (*Forestry Chron., 19 (1943), No. 1, pp. 44–50*).

The relative effectiveness of calcium arsenates composed of large and of small particles, J. C. Gaines and H. A. Dean. (Tex. Expt. Sta. coop. U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 76–79, illus. 1*).—Report is made of tests of a special calcium arsenate containing large particles, a special calcium arsenate-sulfur-rotenone mixture, and commercial calcium arsenate against the boll weevil, bollworm, and aphids at College Station, Tex., and against the boll weevil and aphids at Tallulah, La. The special calcium arsenate and commercial calcium arsenate were found equally effective against weevils at both locations, but the coarse material (special calcium arsenate) did not give as good control of bollworms at College Station as the commercial calcium arsenate. Both materials contained approximately the same percentage of water-soluble arsenic pentoxide. The special calcium arsenate-sulfur-rotenone mixture significantly controlled the aphids and increased the yield at Tallulah, while the aphids did not injure the cotton sufficiently at College Station for the mixture to increase the yields.

Arsenical injury on peaches, W. D. Mills and J. Van Geluwe. (Cornell Univ. et al.). (*N. Y. State Hort. Soc. Proc., 88 (1943), pp. 136–138*).

Homemade concentrated and tank-mix oil emulsions, J. M. Ginsburg (*New Jersey Stas. Cir. 455 (1943), pp. 8*).—A practical account.

Insecticidal aerosols, L. D. Goodhue. (U. S. D. A.). (*Pests, 11 (1943), No. 1, p. 12, illus. 3*).

Tent pullers—the latest advance in fumigation, R. S. Woglum (*Calif. Citrog., 28 (1943), No. 6, pp. 143, 158–159, illus. 6*).

Further studies on oothecae of introduced Asiatic mantids (Orthoptera: Mantidae), H. Fox (*Ann. Ent. Soc. Amer., 36 (1943), No. 1, pp. 25–33*).—These further studies (E. S. R., 83, p. 219) relate particularly to the Chinese mantis and *Tenodera angustipennis* Sauss.

Sodium fluoride crayons for roach control, J. M. Hutzel. (Ohio State Univ. et al.). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 67–69*).—It was shown that wet sodium fluoride can be molded and dried in the form of sticks or crayons which will mark most surfaces like chalk. Such marks or lines applied on infested surfaces will control the German cockroach. Practical applications in a roach-infested restaurant kitchen, a grocery store, and an apartment proved to be effective, safe, convenient, and economical—a distinct improvement over prevailing methods of application.

Variations in thrips populations on onions, J. P. Sleesman (*Ohio Sta. Bimo. Bul. 221 (1943), pp. 96–100*).—In trials conducted for the past 10 yr. at McGuffey thrips populations were significantly higher on some varieties of onions than on others. Important commercial varieties were most susceptible to attack. These included Southport Yellow Globe, Southport White Globe, Southport Red Globe, Early Yellow Globe, and Brigham Yellow Globe. Onion varieties of the Spanish type were intermediate in susceptibility, while White Persian, an introduction from Persia, was the least susceptible of any variety tested. Although this variety is undesirable as a commercial variety, it is being used as a parent in a breeding program.

Present status of citrus thrips control, C. O. Persing, A. M. Boyce, and C. S. Barnhart. (Calif. Citrus Expt. Sta.). (*Calif. Citrog., 28 (1943), No. 6, pp. 142, 165, illus. 1*).—A progress report on the first two phases of the citrus thrips problem, namely, the location and extent of resistant areas and the control problem in these areas.

Increases in aphid populations on potato plants sprayed with zinc arsenite in western Nebraska, R. E. Hill and H. D. Tate. (Nebr. Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 63–66*).—In experimental fields and commercial plantings there were significant increases of aphids where zinc arsenite had been used for the control of the potato flea beetle, especially when two or more applications had been made. Although population increases sometimes occurred following the use of barium fluosilicate dust, these increases were slight as compared to zinc arsenite. In a majority of the tests no significant increases were found where barium fluosilicate had been used. Aphid collections on late plantings, which comprise the principal crop in western Nebraska, showed that populations remained at a low level on both treated and untreated plants until late August or early September. The direct control of aphids with insecticides in this area would be complicated by the fact that the population increases occur late in the season when the use of machinery would cause serious damage to the vines. The use of barium fluosilicate dust, which is as effective as zinc arsenite for the control of flea beetles, may offer one solution of the problem.

Toxicity of cube-vegetable oil dusts to two species of aphids, N. F. Howard and J. W. Apple. (U. S. D. A. and Ill. Nat. Hist. Survey). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 59–62*).—Experiments were conducted with the green peach aphid on turnip and the cotton aphid on okra, the details being given in table form. The former appeared to be more resistant to the dusts than the latter. On the basis of the median lethal dose, cube-talc dust (0.25 percent rotenone) proved significantly more toxic to the cotton aphid on okra in laboratory experiments when combined with 1 percent of grapefruit seed oil or soybean oil than when used alone. Likewise, the addition of 1 percent of peanut oil or olive oil increased the effectiveness of the dust, but the differences were not significant. In tests with the green peach aphid on turnip, the median lethal dose of cube-talc dust appeared to be decreased by the addition of conditioning agents. However, the median lethal dose for unconditioned cube-talc was obtained by extrapolation, and consequently the values cannot be compared for significance.

Combination rotenone-nicotine "blends" for pea aphid control, J. H. Lilly. (Wis. Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 1. pp. 85–97, illus. 2*).—In the research reported the term "blends" as used refers and is restricted to combination insecticidal dusts containing rotenone-bearing materials and nicotine, each in proportionately reduced concentrations, as their toxic ingredients. The rotenone-nicotine blends described are considered to exhibit a true synergistic relationship between the two toxicants when these dusts were used for control of the pea aphid. That is, the total toxic effect of the mixture appeared to be greater than the sum total of the individual effects of the two component insecticides.

"Most of the blends described gave superior pea aphid control in comparison with standard rotenone-bearing and nicotine dusts in extensive field tests in 1941 and 1942. This held under a wide variety of conditions, including situations both favorable and unfavorable to the action of pea aphid dusts. The blends may undergo insecticidal, physical, and chemical deterioration during prolonged storage, but none of them [has] been rendered impotent by storage in our experience, and the complete formula withstood storage surprisingly well. Some supplements (sulfur and certain hygroscopic agents) markedly reduced insecticidal deterioration in storage, but did not entirely eliminate it. Some hygroscopic materials introduce problems of caking in storage and gumming when used during moist weather. Only alkaloidal nicotine should be used in the preparation of rotenone-nicotine blends for pea aphid control, but it may be introduced in either the liquid form or as Black Leaf 10 Dust Base. Ground cube roots have been used almost exclusively as the rotenone-bearing component. An inert diluent of good physical properties should be used in the blends, and about 10 percent of dusting sulfur should be included in the formula to reduce nicotine loss if the dusts are to be stored before use. Pyrophyllite has been the principal diluent in practically all of our formulae; hydrated lime and bentonite clays should not be used. Reduced concentrations of hygroscopic supplements are suggested, pending further investigations. Some practical problems relating to the rotenone-nicotine blends and their commercial use are mentioned.

"Rotenone-nicotine blends now have an experimental background that warrants their introduction into commercial use for pea aphid control. They are being recommended for this purpose in Wisconsin in 1943. The apparent superiority of rotenone-nicotine blends for pea aphid control, coupled with the present shortage of rotenone-bearing insecticides, suggests the possibility of their utilization in other insect control problems. Certain combination dusts containing reduced concentrations of ground cube root and an aliphatic thiocyanate as their toxic ingredients are about on a par with a 0.75-percent rotenone dust, but inferior to the rotenone-nicotine blends, according to our experiments in 1942.

Combination dusts containing rotenone, nicotine, and an aliphatic thiocyanate, all in low concentrations, show promise of controlling the pea aphid just as effectively as the blends, with still greater economy of rotenone-bearing materials and nicotine. Attempts to improve rotenone dusts by supplementing them with relatively high proportions of certain hygroscopic agents and to improve nicotine dusts by replacing 1 percent of the nicotine with Lorol thiocyanate gave inconclusive results in 1941. These leads were not further investigated in 1942."

The pea aphid a constant threat to canning industry, H. Glasgow. (N. Y. State Expt. Sta.). (*Farm Rcs.* [*New York State and Cornell Stas.*], *9* (*1943*), *No. 22, pp. 10–11, illus. 3*).—A practical account.

Ethylene dichloride emulsion and paradichlorobenbene crystals in peach tree borer control, M. L Bobb. (*Virginia Sta. Bul. 347* (*1943*), *pp. 11, illus. 3*).—From tests made during 1939 to 1942, it is concluded that ethylene dichloride emulsion for peachtree borer control may be applied in the fall or early spring. Applications during October when the soil is dry are ideal under Virginia conditions. On clay soils it is necessary to loosen the soil around the trees sufficiently to permit ready absorption of the material. The material may be poured on the ground around the base of the tree, but care must be used so that none of it comes in direct contact with the tree trunk. Two shovelfuls of soil placed around the tree after treatment will prevent surface loss of the fumigant. Paradichlorobenzene crystals were slightly less effective than ethylene dichloride emulsion, and neither caused tree injury when the recommended dosage or dilution was used.

Soybean phosphatides as deposit-builders in nicotine bentonite and lead arsenate spray mixtures for control of the codling moth, L F. Steiner, C. H. Arnold, and J. E. Fahey. (U. S. D. A.). (*Jour. Econ. Ent.*, *36* (*1943*), *No. 1, pp. 70–72*).—In preliminary experiments promising results were obtained with soybean phosphatides as deposit builders for nicotine bentonite and lead arsenate. The findings reported indicate that an effective deposit builder for high cost lead arsenate substitutes may be available, with a consequent saving in cost and materials even where no "overspraying" is done. An important advantage of deposit-building sprays is that they make it possible for the spray men to obtain equal deposits in the top and lower parts of the tree by applying a greater volume of material to the tops.

Codling moth oviposition and fate of eggs, S. A. Summerland and L. F. Steiner. (U. S. D. A.). (*Jour. Econ. Ent.*, *36* (*1943*), *No. 1, pp. 72–75*).—During the season of 1938, 520 marked bearing fruit spurs on apple trees were examined twice weekly in order to obtain information on the egg-laying habits of the codling moth and to determine the fate of eggs deposited under natural conditions. Of 3,581 eggs observed, only 6 percent were deposited on the fruit. On the unbaited trees about 60 percent of the eggs were deposited in the upper branches, but in the presence of bait traps the rate of oviposition in treetops was approximately the same as that in the lower branches. It is concluded that while these observations and data may not be indicative of what might be considered normal they do emphasize the importance that predators, parasites, and control treatments may assume under certain conditions with respect to the aboundance and fate of codling moth eggs.

Recent tests with some of the newer insecticides for codling moth control, D. W. Hamilton. (U. S. D. A. and N. Y. expt. stas.). (*N. Y. State Hort. Soc. Proc.*, *88* (*1943*), *pp. 152–158*).—Report is made of cooperative work conducted in orchards near Poughkeepsie in the Hudson Valley of New York, where there is a definite need of insecticides other than arsenicals that will effectively control the codling moth and incidentally the apple maggot. Recent tests at the Poughkeepsie laboratory indicate that certain nicotine combinations, xanthone, and phenothiazine show possibilities as substitutes for lead arsenate. A processed nicotine bentonite containing 14 percent of nicotine, used with mineral oil, is in general the best nicotine combination that has been tested. Xanthone used in early summer sprays causes russeting of the fruit, but it may be applied during the late-season sprays without injuring the fruit or foliage. The best codling moth control was obtained when xanthone was used in combination with lead arsenate. Phenothiazine is highly toxic to the codling moth, but it leaves an excessive residue on the fruit at harvest. Reducing the particle size of xanthone or phenozthiazine increases the codling moth control obtained with a given amount of material. Nicotine combinations and xanthone do not effectively control apple maggot infestations, but phenothiazine effectively controls the apple maggot as well as the codling moth.

Codling moth in Williams' pears, L. W. Miller (*Jour. Dept. Agr. Victoria, 41 (1943), No. 3, pp. 141–148*).—Further studies (E. S. R., 81, p. 77) of the codling moth, the most serious pest of Williams pears in the Goulburn Valley, conducted during a period of 5 yr., are reported. The details of work on its life history, bionomics, and control are given in tables.

Cutworm control in Oregon, B. G. Thompson (*Oregon Sta. Cir. 147 (1943), pp. 4, illus. 2*).—A practical account.

Studies on ovicides for the Clear Lake gnat, C. C. Deonier and A. W. Lindquist. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 54–56*).—The results of tests of the effectiveness of various materials as ovicides against the Clear Lake gnat in Clear Lake, Calif., are reported, the details being given in table form. The eggs were found to be fairly resistant to all the materials tested. Some of the sprays gave good kills under conditions where the egg films were clean of debris. These materials were not effective, however, when the eggs were partially protected by a scum of pupal skins and dead adults. It was not determined how the materials destroyed the eggs. Clear Lake is used extensively for recreational purposes, hence the use of ovicides containing a large percentage of oil would be objectionable. Furthermore, fish might suffer injury if subjected to appreciable quantities of toxic ingredients commonly used in sprays. The high concentrations and large amounts of material required to effect good kills make ovicides less promising as a control measure than burning with gasoline.

Time-saving methods for handling mosquito light-trap collections, G. H. Bradley and B. V. Travis. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 51–53*).—The studies reported have led to the conclusion that for practical control purposes satisfactory estimates of mosquito abundance can be obtained by operating mosquito light traps every second or third day instead of daily. Also, when several hundred mosquitoes are present in a single collection it is practical to identify the species in only one-fourth or one-half the catch and to calculate the total collection on the basis of this fraction.

The distribution of Aedes mosquito eggs on salt marshes in Florida, B. V. Travis and G. H. Bradley. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 45–50*).—Description is given of a method for determining the density and distribution of eggs of *A. taeniorhynchus* and the salt-marsh mosquito in their breeding places on the large salt marshes in Florida. These species are the most important pest mosquitoes in seaboard communities, *A. taeniorhynchus* being the dominant species. By this method random samples of soil were collected along transect lines on representative marshes. These samples were later flooded and the resulting mosquito larvae recorded. From these records egg densities were computed on an area basis. The data presented were obtained by collecting and flooding 12,203 soil samples taken during 1930–41 from salt marshes along the east coast of Florida, chiefly in Volusia County.

"Random samplings made on dry marshes following mosquito flights indicated rather accurately the relative value of the marshes as mosquito producers, but the method did not locate or correctly evaluate the breeding marshes when samplings were made during the late fall, winter, or spring. During these periods eggs were located on higher miscellaneous situations. On one marsh the eggs were as numerous on a ditched section as on an adjacent unditched section, and in this case as many eggs were found near the ditch as away from it. In the ditched and diked areas observed fewer eggs were found on marshes inside the dikes than on comparable undiked areas. The excessive drying appeared to decrease the attractiveness of the marsh for oviposition. On irregular marsh surfaces the eggs were found to be most abundant on the higher contours. The higher egg densities were found where the dominant vegetation was *Sporobolus virginicus* (L.) Kunth., *Distichlis spicata* (L.) Greene, or *Salicornia perennis* Mill. Lower egg densities occurred where *Juncus roemerianus* Scheele, *Spartina alterniflora* Loisel, *S. bakeri* Merr., or *Batis martima* L. were dominant."

Tests of fly repellents of known ingredients and of selected commercial sprays on dairy cattle, A. O. Shaw, R. C. Smith, F. W. Atkeson, H. C. Fryer, A. R. Borgmann, and F. J. Holmes. (Kans. Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 23–32*).—The work here presented, the details of which are given in seven tables, has been noted from another source as reported by Atkeson et al. (E. S. R. 89, p. 240).

Techniques for conducting fly-repellency tests on cattle, H. C. Fryer, A. O. Shaw, F. W. Atkeson, R. C. Smith, and A. R. Borgmann. (Kans. Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 33–44, illus. 3*).—This contribution relates to the technics employed in the course of the fly repellent work noted above. "It is recognized by the authors of this paper that the process of transforming data in order to normalize their distribution might benefit by further research designed to make the method more objective and rigorous. However, it is our belief that the statistical procedures and the points of view presented in this paper can be made the basis for a standard and acceptable method for cattle fly spray tests."

New recommendations for large scale control of the sheep tick in the Northeast, H. H. Schwardt and J. G. Matthysse. (Cornell Univ.). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 105–107, illus. 4*).—A plan for and description of a portable dipping vat, together with directions for its use in controlling the sheep tick, are presented.

Three dipping formulas which have given sufficient promise to justify large-scale tests are (1) cube (5 percent rotenone) 10 lb., wettable sulfur 100 lb., and water 1,000 gal.; (2) fixed nicotine (Black Leaf 155) 10 lb., wettable sulfur 100 lb., and water 1,000 gal.; and (3) wettable sulfur 100 lb. and water 1,000 gal.

Synoptic revision of the testaceipennis group of the beetle genus Phyllophaga, L. W. Saylor (*Jour. Wash. Acad. Sci., 33 (1943), No. 4, pp. 106–110, illus. 6*).

White grub problem ever present in New York State, H. H. Schwardt. ([N. Y.] Cornell Expt. Sta.). (*Farm Res. [New York State and Cornell Stas.], 9 (1943), No. 2, pp. 7, 15, illus. 3*).—A practical account.

Classification of the Dermestidae (larder, hide, and carpet beetles) based on larval characters, with a key to the North American genera, B. E. Rees (*U. S. Dept. Agr., Misc. Pub. 511 (1943), pp. 18, illus. 5*).—This publication contains a discussion of the subfamily and generic relationships and includes a key to the subfamilies and North American genera.

Relation between tree growth and outbreaks of the Black Hills beetle, J. A. BEAL (*Jour. Forestry, 41 (1943), No. 5, pp. 359–366, illus. 9*).

Prevention and control of alfalfa weevil damage, J. C. HAMLIN, W. C. MCDUFFIE, F. V. LIEBERMAN, and R. W. BUNN (*U. S. Dept. Agr., Farmers' Bul. 1930 (1943), pp. 13+, illus. 11*).—This supersedes Farmers' Bulletin 1528 (E. S. R., 57, p. 562).

Relation between winter temperatures, boll weevil survival, summer rainfall, and cotton yields, R. C. GAINES. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 82–84*).—It was found in a limited number of records that the number of boll weevils in woods trash was associated with the number of boll weevils present in cottonfields during the following May and June. Since the correlations between winter temperatures and the number of weevils in cottonfields during May and June were significant, the inference would be that ground trash affords an important shelter for the weevils during the winter.

Methyl bromide fumigation for control of the sweetpotato weevil and its effect on yield, G. L. PHILLIPS, S. S. EASTER, and G. HORAIST, JR. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 98–101*).—Experimental work with methyl bromide in the fumigation of sweetpotatoes for the control of the sweepotato weevil was conducted at Sunset, La., and Fairhope, Ala., during the years 1938–41. In a series of 15 laboratory tests with 1,122 infested plants, methyl bromide at the rate of 10 oz. per 1,000 cu. ft. for 4 hr. at 80° F. gave a complete kill of all weevil stages. In 38 field tests with 177,749 draws and vine cuttings, dosages as high as 25 oz. per 1,000 cu. ft. for 4 hr. at 80° or above caused no excessive mortality to the plants. From approximately 1,580,000 draws and vine cuttings fumigated and used for commercial plantings, satisfactory stands and yields were obtained. It thus appears that a reasonably wide margin of safety exists between the dosage which will injure the plants and that required to destroy the sweetpotato weevil in the plants. A dosage of 16 oz. per 1,000 cu. ft. for 4 hr. at 80° appears to be the most convenient schedule for commercial usage.

Supersedure of queens in package bees, E. BRAUN (*Sci. Agr., 23 (1943), No. 7, pp. 424–438*).

Racial differentiation in Nearctic species of Dianthidium (Hymenoptera: Apoidea), P. H. TIMBERLAKE. (Calif. Citrus Expt. Sta.). (*Jour. N. Y. Ent. Soc., 51 (1943), No. 2, pp. 71–109*).

Further tests with thallium baits for control of the fire ant, B. V. TRAVIS. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 56–58*).—In further tests (E. S. R., 82, p. 367) conducted in northern Florida with different proportions of thallium acetate and thallium sulfate in sirup baits, applied to fire ant colonies in aluminum bait cans, in sawdust, and in excelsior, the best results were obtained with the 1-percent baits when applied in bait cans. In tests with the 1-percent baits, for all methods of application, thallium acetate destroyed 94 percent and thallium sulfate 88 percent of the treated colonies. By the bait can method of application 86 percent of the colonies treated with all concentrations of thallium acetate and 90 percent of those treated with thallium sulfate were destroyed. The bait can method was found to be superior to either the sawdust or the excelsior method of application. Although slightly less effective than when applied in cans, thallium acetate applied by a sawdust method appears to have merit for field use, even though the results were slightly lower than by the can method, because much less time is required in distributing the baits and the cost of the container is eliminated.

Laboratory rearing of Microbracon vestiticida Vier. on the bean weevil, with notes on the life history of the parasite, H. D. SMITH. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 1, pp. 101–104*).—The search for a method of rearing this parasite of the Peruvian cotton square weevil *Anthonomus vestitus* Boh., first imported into the United States in the fall of 1941 after evidence had been obtained that it would attack the boll weevil, is reported upon. The bean weevil was the only insect found to attract the parasite, infested beans in mosquito netting tubes or sacks having proved to be the most satisfactory for oviposition. The egg is deposited externally on the host. The first larva that hatches kills all eggs and larvae that hatch later. Only a few hosts are paralyzed, or stung, by the female. The nonparalyzed host is killed by the young larva in a day or two. A feeding tube is formed extending from the host to the bean skin. The last complete generation in the experimental series yielded 9.6 progeny per female for the 100 females that were used. By the use of the bean weevil as an alternate host, it is possible to build up the parasite stock during the winter, when immature stages of the boll weevil are not available, so that large releases can be made as soon as the proper stages of the weevil occur in the field in early summer.

A new spinning mite [Paratetranychus sacchari] attacking sugar cane in Puerto Rico, E. A. MCGREGOR. (U. S. D. A.). (*Jour. Agr. Univ. Puerto Rico [Univ. Sta.], 26 (1942), No. 4, pp. 91–94, illus. 7; Span. abs., p. 92*).

The occurrence of a rare genus of ticks on bats in Puerto Rico (Acarina: Spelaeorhynchidae), I. FOX (*Jour. Agr. Univ. Puerto Rico [Univ. Sta.], 26 (1942), No. 4, pp. 95–97; Span. abs., pp. 96–97*).—The parasitization of the common fruit-eating bat *Artibeus jamaicensis jamaicensis* by immature *Spelaeorhynchus latus* Banks in Puerto Rico is reported upon. In each case a single tick was found in the lower part of the ear and in one instance in each ear. This is said to be the first record of the occurrence of a species of the genus in Puerto Rico.

Toxicity of some dinitrophenols to the American dog tick (Dermacentor variabilis (Say)), O. E. and A. H. TAUBER, C. R. JOYCE, and W. N. BRUCE. (Iowa Expt. Sta.). (*Jour. Wash. Acad. Sci., 33 (1943), No. 4, pp. 97–105, illus. 1*).—Report is made of experiments intended as preliminary to field tests of the toxicity of dinitrophenols for ticks concentrated on selected areas of dusted vegetation. It was found that unfed and engorged adult specimens of the American dog tick possess a decided difference in susceptibility to contact with dinitro-ortho-cresol and other dinitrophenols. Thus, 12 percent DN–o–C, with pyrophyllite as a diluent, applied at the rate of 65 to 75 lb. to the acre, has a 48-hr. mortality of 88 percent with unfed adults and 45 percent with engorged adults. The results led to the conclusion that field control of this tick with DN–o–C or NH_4–DN–o–cresylate is difficult but not impossible.

Ixodes mexicanus n. sp. e Ixodes tancitarius n. sp. dos nuevas garrapatas Mexicanas (Acarina: Ixodidae) [Ixodes mexicanus and Ixodes tancitarius, two new Mexican ticks], R. A. COOLEY and G. M. KOHLS (*Rev. Soc. Mex. Hist. Nat., 3 (1942), No. 1–4, pp. 149–154, illus. 2; Eng. abs., p. 154*).—*I. mexicanus*, taken from a wren (*Helcodytes gularis*) at an altitude of 6,000 ft. and *Junco phaenotus australis* at an altitude of 11,000 ft., and *I. tancitarius*, taken from a harvest mouse (*Reithrodontomys* sp.) at an altitude of 7,800 ft., both near Tancitaro, Michoacán, Mexico, are described as new to science.

An unusual site of attachment for ticks, R. DU TOIT and H. O. MÖNNIG (*Jour. So. African Vet. Med. Assoc., 13 (1942), No. 3, pp. 79–80*).—Observations of the attachment of the bont-legged tick *Hyalomma aegyptium impressum* Koch and the bont tick *Amblyomma hebraeum* Koch to the mucous membrane of the mouths of cattle are reported. While it is considered improbable that female ticks would be able to complete engorgement in such a site, the possibility exists that diseases such as heartwater may be transmitted if any feeding takes place by infected ticks.

Development of the swine thorn-headed worm Macracanthorhynchus hirudinaceus in its intermediate host, K. C. Kates. (U. S. D. A.). *Amer. Jour. Vet. Res., 4 (1943), No. 11, pp. 173–181, illus. 25*).—Description is given of the principal anatomical features in the developmental stages of *M. hirudinaceus* in the green June beetle and May beetles, its intermediate hosts.

ANIMAL PRODUCTION

Preliminary report on pasture investigations technique, O. S. Aamodt, R. H. Lush, W. P. Garrigus, et al. (*Jour. Dairy Sci., 26 (1943), No. 4, pp. 353–369*).—The combined recommendations of representatives to a joint pasture committee of the American Society of Agronomy, American Dairy Science Association, and American Society of Animal Production are given for the conduct of pasture research for experimental purposes. Methods are presented for the selection and management of experimental pastures, the types and management of the animals, and the products produced by them.

The teart pastures of Somerset.—I, The cause and cure of teartness, W. S. Ferguson, A. H. Lewis, and S. J. Watson (*Jour. Agr. Sci. [England], 33 (1943), No. 1, pp. 44–51*).—A chemical examination of teart pasturage as contrasted with pastures not causing scouring in sheep and cattle showed the only difference between them to be the molybdenum content, and in the summer and autumn there were larger quantities of molybdenum per million parts of dry matter than during other seasons or from pastures not causing the toxic effects. The hay contained fairly large amounts of molybdenum, yet it did not cause scouring. Scouring was induced in several milking cows by daily drenches and feeding 2–3 gm. of sodium or ammonium molybdate, but in some cows scouring did not occur. The treatment of pastures with 20–30 lb. of sodium molybdate per acre caused scouring when the grass was consumed. It was treated or prevented in the animals by daily drenches of 2 gm. of copper sulfate.

Further investigations of the feeding value of artificially dried potatoes: The composition and nutritive value of potato cossettes, potato meal, potato flakes, potato slices, and potato dust, H. E. Woodman and R. E. Evans (*Jour. Agr. Sci. [England], 33 (1943), No. 1, pp. 1–14*).—As a sequel to investigations on the composition and feeding value of potato cossettes and meal (E. S. R., 82, p. 806), analyses of their digestibility by pigs and sheep indicated that these feeds compared closely with cereals when adequate protein and minerals were supplied. Pigs were able to utilize the feeds in digestion experiments more efficiently than sheep. Potato flakes may be included in rather large amounts in the rations of pigs without causing digestive disturbances or lowering the protein digestibility of other feeds. In farm scale feeding trials with pigs, potato slices could replace the cereals provided adequate protein and minerals were available. Potato dust, a byproduct in the manufacture of potato slices, could also be fed to bacon pigs as a partial substitute for cereals. This feed was most efficiently utilized by pigs weighing not over 80 lb. and when the potato dust did not constitute more than 30 percent of the ration.

The culture of Eudiplodinium neglectum, with experiments on the digestion of cellulose, R. E. Hungate (*Biol. Bul., 83 (1942), No. 3, pp. 303–319, illus. 1*).—A successful method for culturing this organism anaerobically on a medium of grass and cellulose with inorganic salts which proved successful in transfers for 22 mo. was described. The protozoa were helpful to the host and established a symbiotic relationship. An enzyme extract active in cellulose digestion was prepared.

Further experiments on cellulose digestion by the protozoa in the rumen of cattle, R. E. Hungate (*Biol. Bul., 84 (1943), No. 2, pp. 157–163, illus. 1*).—Cultural studies of *Diplodinium maggii, D. multivesciculatum, D. denticulatum*, and *Entodinium caudatum* showed that all species digested cellulose, but other rumen protozoa and bacteria did not. The *Diplodinium* were grown in flask cultures, using as substrates grass, cellulose, and ground wheat, either singly or in combination. The *Diplodinium* cultures were grown anaerobically by the method described above and were stained with iodine after 7, 11, and 13 hr. of starvation and again 2 hr. after feeding cellulose, with the presence of starch indicated.

Nutrition of the golden hamster, J. M. Cooperman, H. A. Waisman, and C. A. Elvehjem. (Wis. Expt. Sta.). (*Soc. Expt. Biol. and Med. Proc., 52 (1943), No. 3, pp. 250–254, illus. 3*).—One of the limiting factors in purified diets for the golden hamster was found to be biotin. When several vitamins in the B complex were added to a purified diet, which supported growth and reproduction in the rat but which was deficient for hamsters, there was no improvement unless biotin was included in the purified form or as liver extract. The survival time of the hamster was increased with para-aminobenzoic acid and inositol, but vitamin C and nicotinic acid did not seem to be required. Female hamsters seemed to grow faster than males. Growth rates on the basal ration with eight B vitamins and biotin were 1.12 and 1.40 gm., respectively, per day in males and females as contrasted with 0.66 and 0.95 gm. without biotin and 0.9 and 1.0 gm. per day on the stock ration.

Save the young animals, J. H. Longwell et al. (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 4, pp. 18–28*).—General directions for the management of pregnant females and colts, calves, lambs, pigs, and chicks for saving a maximum number and promoting good growth.

Fattening steers on milo grain in the southern Great Plains, W. H. Black, P. E. Howe, J. M. Jones, and F. E. Keating. (Coop. Tex. Expt. Sta.). (*U. S. Dept. Agr., Tech. Bul. 847 (1943), pp. 15, illus 6*).—In three feeding experiments averaging 187 days in duration, full feeding steers individually and in groups on milo grain and cottonseed meal with sumac fodder or silage produced more rapid gains than rations in which milo grain was limited to 80 percent of the above consumption. However, the limited feeding produced more gain per pound of feed than full feeding in both individual and group-feeding tests. High carcass grade was closely associated with high feed intake in the full-fed lots, and limited feeding tended to inhibit the development of high carcass quality. Steers fed in groups made slightly greater gains than those fed individually. The study was conducted at Big Spring, Tex., beginning in the fall with 4 lots of 10 steers each, calved in the spring.

A note on the effect on the kidneys and livers of feeding urea to steers fattening in dry lot and on pasture, S. H. Work, C. J. Hamre, L. A. Henke, and L. E. Harris. (Hawaii Expt. Sta.). (*Jour. Anim. Sci., 2 (1943), No. 2, pp. 166–169*).—Study of the point below 2.8 percent urea in the ration of cattle at which kidney injury, found by Hart et al. (E. S. R., 82, p. 239), did not occur showed that urea at 0.88 and 2.29 percent of the dry matter fed to steers in dry lot for 244 days did not cause liver or kidney damage. When there was a complete replacement for cottonseed meal supplements 0.18 and 0.35 lb. of urea with pasture caused no damage and no diuresis was observed. Consumption of 10.7 lb. or larger amounts in other lots caused diarrhea. The kidneys and livers of representative animals were examined histologically.

Sheep, L. J. Horlacher and C. Hammonds (*Danville, Ill.: Interstate, 1942,* [*2, ed., rev.*], *pp. 348, illus. 140*).—Revised edition of book previously noted (E. S. R., 77, p. 230).

Breeds of sheep, J. F. Walker (*Chicago: Breeder Pubs., 1942, pp. 128, illus. 39*).—Brief description and illustration of the breeds of sheep and their early history.

Bibliography on nutrition of sheep, M. E. Whalley (*Ottawa: Natl. Res. Council Canada, 1942, pp. 86+*).—A compilation by authors and a detailed subject index of literature on various phases of the nutrition of sheep.

The fluctuation of pH and organic acids in the rumen of the sheep, A. T. Phillipson (*Jour. Expt. Biol., 19* (*1942*), *No. 2, pp. 186–198, illus. 2*).—The pH of the rumen contents of sheep was found to vary with the feeds eaten and the length of time since they were fed. When food was withheld the pH rose slowly to 7. When grain, roots, and hay were fed the pH was lowered, but the lowest values were found when grazing, because the young plant tissues are more easily attacked by bacteria and larger amounts of food are consumed than in dry lot. The peak of volatile acids and low period for pH occurred soon after feeding on mangels and cabbage. It was delayed with bran and oats on a hay diet and occurred in most animals 12 hr. or more after feeding. The study was based on the analysis of rumen ingesta removed by suction through rumen fistula in 11 sheep, two of which also had abomasum fistulas. The changes in pH were taken to reflect fluctuations in the quantity of organic acids. The amounts of lactic acid and volatile acids were ascertained in different intervals up to 48 hr. after feeding and withholding drinking water.

Studies on the fate of carbohydrates in the rumen of the sheep, A. T. Phillipson and R. A. McAnally (*Jour. Expt. Biol., 19* (*1942*), *No. 2, pp. 199–214*).—Studies of the rumen contents of sheep with rumen and abomasal fistulas in the above experiment showed that glucose, fructose, and cane sugar undergo rapid fermentation and pass through a stage of lactic acid production to that of volatile lower fatty acids. Maltose, lactose, and galactose were fermented less rapidly, and lactic acid, if formed in fermentation, does not accumulate in the ingesta. When present in quantities in the rumen, some appears in the abomasum. The rapid disappearance of glucose from the rumen cannot be accounted for by its passage through the abomasum, nor do volatile acids pass into the abomasum in any quantity. They are probably absorbed in the rumen or omasum. Starch and cellulose were fermented slowly, and the production of volatile acids was prolonged.

Activities and grazing habits of sheep on summer ranges, C. W. Doran. (U. S. D. A. and Colo. State Col.). (*Jour. Forestry, 41* (*1943*), *No. 4, pp. 253–258, illus. 3*).—Observations of management, habits, and plants eaten by bands of about 1,000 ewes with lambs on summer ranges at 8,600–9,600 ft. elevation in 3 yr. showed that during an average grazing day of 14½ hr. the ewes spent 6¾ hr. feeding, 1¾ hr. traveling, and 5¾ hr. resting and ruminating. The lambs spent about 70 percent as much time grazing throughout the summer grazing period as the ewes. The utilization of individual forages was influenced by abundance, composition of the forage, habits of the sheep, season of the year, stage of plant growth, climatic conditions, and management practices. The species of grasses, weeds, and browze grazed each year by representative ewes and lambs were identified with field glasses, and suggestions were made for handling sheep on summer ranges.

Feeding lambs shorn and in wool, W. G. Kammlade and S. W. Terrill. (Univ. Ill.). (*Natl. Wool Grower, 33* (*1943*), *No. 5, pp. 21–23*).—Six lots of about 40 lambs each fed for 84 days in dry lot on rations of shelled corn and soybean meal, 7:1, 4:1, and 2:1, made average daily gains of approximately 0.4 lb. whether or not they were shorn at the beginning of the test. The wool lambs showed slightly greater gains and profits than those which were shorn, although the dressing percentages of the shorn lambs were slightly greater.

Ear measurements in relation to pelt thickness and fur characters of Karakul lambs, J. I. Hardy and V. L. Simmons. (U. S. D. A.). (*Jour. Anim. Sci., 2 (1943), No. 2, pp. 146–151, illus. 1*).—The birth weights of Karakul lambs were related to the ear skin thickness and tightness of curl. The ear skin thickness was significantly related to the thickness of the hide at the shoulder and middle of the back. A significant relation was also found between ear length and the desirability of the fur. The study was based on measurements of ear thickness of 166 and ear length of 158 purebred and crossbred Karakul lambs.

The value of potato peelings in the nutrition of the bacon pig, H. E. Woodman and R. E. Evans (*Jour. Agr. Sci. [England], 33 (1943), No. 1, pp. 15–17*).—Determinations of the composition and digestibility of potatoes and potato peelings showed that cooked potato peelings were highly digestible in the rations of two bacon pigs. The nitrogen-free extract was 96.2 percent digestible. As much digestible organic matter was supplied by 5 lb. of potato peelings as was present in 4 lb. of potatoes. It was concluded that 1 lb. of barley could be replaced by 4 lb. of potatoes or 5 lb. of potato peelings. Both the potatoes and potato peelings should be cooked before feeding.

Response of pigs given large doses of Salmonella choleraesuis to sulfaguanidine, nicotinic acid, thiamin, and pyridoxine, G. K. Davis, E. B. Hale, and V. A. Freeman. (Mich. Expt. Sta.). (*Jour. Anim. Sci., 2 (1943), No. 2, pp. 138–145*).—Thirty-six crossbred and Poland China pigs were given cultures of *S. cholcraesuis* and individually fed for 50 days by methods previously described (E. S. R., 83, p. 97), on a basal ration consisting largely of corn supplemented, in eight groups for variance analyses, with the above-mentioned products and liver, and with combinations of them. The results showed that sulfaguanidine was effective in protecting the pigs from *S. choleraesuis*. Following the initial set-back, nicotinic acid was effective in promoting rapid recovery and increased gains. Vitamins B_1 and B_6 were not effective.

Effect of work on the calcium and phosphorus retention of Percheron geldings, A. L. Harvey, B. H. Thomas, C. C. Culbertson, and E. V. Collins. (Iowa Expt. Sta.). (*Jour. Anim. Sci., 2 (1943), No. 2, pp. 103–111, illus. 2*).—Neither a maintenance ration of 3 lb. of oats and 20 lb. of timothy hay nor the same ration fortified during work periods with additional energy as sugar and dextrinized starch supplied sufficient calcium and phosphorus to meet the requirements of two geldings weighing about 1,680 lb. each. However, these rations maintained weight and kept the horses in positive nitrogen balance. Various amounts of work did not seem to affect the mineral balances. The studies were conducted in 2-week periods with maintenance, light, medium, and heavy work, in which there were developed 0, 0.56, 0.93, and 1.27 hp. in a 4-hr. period each day. A final week of maintenance concluded the experiment.

Poultry bibliography, L. F. Payne (*Kansas Sta., 1943, p. 83*).—A list of about 2,500 poultry books arranged alphabetically by author.

The reputed reservoir function of the spleen of the domestic fowl, P. D. Sturkie. (Ala. Expt. Sta.). (*Amer. Jour. Physiol., 138 (1943), No. 4, pp. 599–602*).—Contrary to the results of Harmon (E. S. R., 75, p. 391), the spleen of the fowl did not have a reservoir function for hemoglobin. Prior to and after asphyxiation the blood of 11 fowls was found on repeated tests to have 8.9 and 9.12 gm. of hemoglobin per 100 cc. A variance analysis showed that the means of blood samples from these birds after splenectomy of 9.03 and 8.95 gm. were not significantly different. It was therefore considered that in the fowl the spleen did not act as a reservoir for erythrocytes, which are expelled into the blood stream of mammals by asphyxiation because of the heavier splenic capsule.

Compensatory hypertrophy of a single kidney in the domestic fowl, M. R. Irwin. (Mo. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 3, pp. 270–271*).—A hen's single kidney weighing 81.5 percent of the weight of both kidneys of five comparable females at 12–14 weeks of age indicates the complete atrophy of one kidney and hypertrophy of the other to nearly equal the weight of two kidneys.

Increasing yellow pigmentation in shanks of chickens, H. R. Bird. (Md. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 3, pp. 205–208, illus. 1*).—In three experiments, it was shown that excellent shank pigmentation was induced in crossbred Barred Plymouth Rock × New Hampshire chicks in 10 days by proper feeding. The average pigment scores indicated by the yolk color rotor were increased from about 6 to 11 or 12 in 10 days by the inclusion of 16 percent of corn gluten meal in the ration. No additional pigmentation was induced by increasing the corn gluten meal to 20 percent. A definite inhibiting effect of meat and bone meal on shank pigmentation was noted, in accord with previous findings (E. S. R., 86, p. 230). The experiments were conducted for about 2 weeks with individual weights and shank color of lots of 20–25 6–10-week-old male and female chicks with protein supplements from corn gluten, dried skim milk, and meat and bone scrap. These results indicated that not more than 10 days were needed to induce proper pigmentation in birds before slaughtering.

Spring bluegrass versus mature bluegrass as pasture for laying hens, G. D. Buckner, W. M. Insko, Jr., and A. Harms. (Ky. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 3, pp. 248–251*).—A study of the egg production, hatchability, and amounts of mash eaten by lots of 23 hens during a year showed the same average consumption of 0.28 lb. per head daily when the birds were kept in a house at all times as by others having access to a 50-by-100 ft. bare yard or a yard in which there was mature bluegrass. The average daily all-mash ration consumption was reduced to 0.21 lb. when spring-growth bluegrass was available in the yard. There were no significant differences in the hatchability of the eggs or condition of the hens in the three plots, but there was a slight increase in egg production when the spring bluegrass was available. The hens did not appear to eat the mature grass. Chemical analyses showed a greater fiber and nitrogen-free extract content than was present in early growth.

Influence of thyroactive iodocasein on growth of chicks, J. E. Parker. (Tenn. Expt. Sta.). (*Soc. Expt. Biol. and Med. Proc., 52 (1943), No. 3, pp. 234–236*).—Five lots of Rhode Island Red chicks showed a growth-stimulating effect from additions of small amounts of thyroactive iodocasein. Additions of 0.025 and 0.05 percent produced greater gains and required less feed per unit of gain up to 12 weeks of age than were observed in control animals. Feathering was more complete in accord with the amounts of thyroactive iodocasein up to 0.2 percent of the ration. The effects of different amounts of the supplement on the efficiency of feed utilization appeared to differ with the rate of growth. Thyroactive iodocasein-fed chicks utilized feed more efficiently than the controls when gaining at the more rapid rate.

Further evidence of the need for supplementing soybean meal chick rations with phosphorus, G. F. Heuser, L. C. Norris, J. McGinnis, and M. L. Scott. (Cornell Univ.) (*Poultry Sci., 22 (1943), No. 3, pp. 269–270*).—Reasonable quantities of nonphytin phosphorus were required in chick rations for normal growth and bone development to 8 weeks of age. The increases were found in groups of 15 Rhode Island Red cockerels fed on rations containing 27 percent of yellow corn meal, 25 percent of crushed wheat or wheat products, and 30 percent of soybean meal when 2 percent of the corn meal was replaced by an equivalent amount of steamed bonemeal. It was assumed that the phosphorus was chiefly organic and that phytin was relatively unavailable even in the presence of vitamin D.

Alkaline phosphatase and egg formation, M. S. Gutowska, E. M. Parrott, R. M. Verburg, and R. T. Parkhurst. (Mass. Expt. Sta.). (*Poultry Sci.*, *22* (*1943*), *No. 3*, *pp. 195–204*, *illus. 1*).—The King-Armstrong units of phosphatase cited by Wiese et al. (E. S. R., 81, p. 694) in the blood plasma of hens were important factors in egg production, but were doubtful indications of shell strength of the eggs. When the hens were grouped as to good and poor producers, the good producers with good and poor shell strength had averages of 14.17 and 13.83 K. A. units per 100 cc. of plasma as contrasted with 12.42 K. A. units by the producers classified as poor with good shell strength and 11.48 by the poor producers with poor shell strength. The 12 hens classified as good producers laid 238 or more eggs each in the first year to September 23. The 10 hens classified as poor producers laid from 96 to 207 eggs in the same period. The amount of phosphatase determined in the shell gland, the oviduct, the ova, and the tibia of the hens was low. The blood for analysis was obtained from the heart.

Wartime poultry feeds, R. Penquite, R. B. Thompson, and V. G. Heller (*Oklahoma Sta. Bul. 244*, *Sup.* (*1943*), *pp. 6*).—This supplement (E. S. R., 84, p. 382) contains a general discussion of the feeds available for emergency rations.

High points in increased wartime poultry and egg production, D. C. Kennard and V. D Chamberlin (*Ohio Sta. Bimo. Bul. 221* (*1943*), *pp. 50–53*).—General directions for growing and housing chicks, pullets, and laying hens.

Whey solubles as a source of growth factors in chick rations, E. P. Berry, C. W. Carrick, R. E. Roberts, and S. M. Hauge. (Ind. Expt. Sta.). (*Poultry Sci.*, *22* (*1943*), *No. 3*, *pp. 252–263*).—Satisfactory broiler-starting and pullet-starting rations were developed with large amounts of yellow corn and soybean meal when certain factors of the vitamin B complex were supplied by whey solubles. The supplemental value of whey solubles was compared with meat and bone scrap and plant proteins for broiler production to 6–8 weeks of age in rations consisting largely of yellow corn and expeller process soybean meal. The results with 61 lots, in which about 25 day-old Barred Plymouth Rock chicks were given supplements of riboflavin, choline, nicotinic acid, calcium, pantothenate, and pyridoxin, singly or in combinations, indicated that, when soybean meal replaced the animal protein, growth was reduced because an insufficient amount of a growth factor or factors of animal protein was not supplied, rather than because of deficiencies in the protein quality. Growth was improved when meat and bone scrap, dried skim milk, or choline, nicotinic acid, and pyridoxin were made available. Satisfactory growth was obtained in pullets on starting rations with supplements of 3 percent meat and bone scrap, 5 percent alfalfa meal, and 1 percent whey solubles or 0.5 percent whey solubles and 3 percent distillers' dried solubles. The growth factor reported previously in casein (E. S. R., 86, p. 76) was present in whey solubles, but 0.5 percent whey solubles did not correct the deficiencies of choline, nicotinic acid, and riboflavin in the corn-soybean meal basal ration. An adequate amount of these vitamins was furnished by 1 percent whey solubles, 5 percent alfalfa leaf meal, and 5 percent meat and bone scrap. Approximately 2 percent whey solubles was required to replace 5 percent dried skim milk in the ration with 3 percent alfalfa leaf meal. The amount of whey solubles required to replace 5 percent skim milk was increased when the alfalfa leaf meal was reduced from 5 to 3 percent, indicating that some factor, probably riboflavin, is supplied by alfalfa leaf meal, which is also contained in whey solubles.

Broiler production with high-protein feeds, H. D. Polk and C. E. Barnett (*Mississippi Sta. Bul. 374* (*1943*), *pp. 13, illus. 2*).—Chicks from 1 to 9 weeks of age were employed in comparing rations in which high-protein feeds were supplied singly or in combination from shrimp meal, soybean meal, cottonseed meal, and meat scrap in three experiments. The rations compared consisted in general of approximately 20 percent protein from these sources. More economical gains were secured from rations receiving both animal and vegetable proteins than from either alone. Shrimp meal carried sufficient minerals to practically eliminate perosis when fed at the rate of 9–12 percent with vegetable protein. Machine-dried shrimp meal was the most satisfactory single high-protein source included. Cottonseed meal proved the least satisfactory from the standpoint of weight increase, occurrence of slipped tendon, vigor, and condition. In the first of three experiments in which meat scrap provided the single high-protein feed, weight increases were only slightly better than birds receiving cottonseed meal, and 18 of 50 chicks had perosis. By adding 2.5 gm. of manganese sulfate per 100 lb. of feed, slipped tendon was prevented in two further trials. When supplemented with oystershell flour and steamed bonemeal, soybean meal compared favorably with other high-protein sources, but birds on soybean meal and cottonseed meal rations did not carry the finish of chicks supplied with other sources of protein. The studies were continued in three trials with a total of 130 chicks on most of the rations.

Effect of relative humidity and amount of turning on hatchability of turkey eggs and livability of poults, W. M. Insko, Jr., D. W. MacLaury, and A. T. Ringrose (*Kentucky Sta. Bul. 438* (*1942*), *pp. 14*).—Continuing studies of artificial incubation of turkey eggs (E. S. R., 75, p. 534), the best results in hatching 6,601 fertile eggs were obtained at higher rather than lower humidity levels, with an incubation temperature of 99.5° F. Wet-bulb temperatures of 83°–84° (50–53 percent relative humidity) gave significantly poorer hatching results than with wet-bulb temperatures of 85°–88° (55–63 percent relative humidity). In another experiment slightly but not significantly better hatches were obtained at humidity levels of 61–63 than 67–69 percent in four of six incubations, suggesting this to be close to the optimum humidity requirements. The mortality during each week of incubation indicated humidity to be most important during the fourth week. Differences in humidity seem to have little or no effect on mortality of the poults, but when the eggs were transferred to forced-draft incubators on the twenty-fourth day of incubation hatch was significantly better than in natural-draft incubators. These data are based on the hatching results with 5 settings of over 100 eggs of Bronze and Small White breeds and crosses between them incubated at each of three humidities, and a second trial in which the eggs were transferred to forced draft and natural-draft incubators on the twenty-fourth day of incubation.

In another experiment, with 9,454 fertile turkey eggs, involving a cessation of turning the eggs on the eighteenth, twentieth, twenty-second, and twenty-fourth days, there was no significant difference in the hatchability of the groups, but the highest hatchability was found in a group in which turning was stopped on the twenty-second day. In 11 other hatches, turning the eggs until the twenty-fourth day gave better results in 10 trials than turning through the twenty-first day only. This period would provide more equitable use of time in practical operations.

Relation of quality of animal protein concentrate in the diet to growth of poults, H. J. Almquist and V. S. Asmundson. (Univ. Calif.). (*Poultry*

Sci., 22 (1943), No. 3, pp. 265–266).—Poults were found to respond similarly to chicks (E. S. R., 85, p. 383) to supplements of tuna meal, shark meal, sardine meal, and meat scrap. The protein quality index determined chemically and the net gains and efficiency of gains were closely correlated in both poult and chick studies. The study was conducted with the animal protein supplements making 6.5 percent of the protein in the rations of groups of 10 poults each, with repetitions of some tests.

The choline content of feeds, M. Rhian, R. J. Evans, and J. L. St. John. (Wash. Expt. Sta.). *(Jour. Nutr., 25 (1943), No. 1, pp. 1–5)*.—The importance of choline with manganese in the prevention of perosis in turkeys (E S. R., 88, p. 237) led to determination of the choline content of poultry feeds by methods previously described by Jacobi et al. (E. S. R., 86, p. 420). The cereal grains were poor sources of choline. Animal products such as liver and fish meal are good sources, but soybean meal and meat meal were intermediate. The choline content of a number of poultry feeds is presented.

The choline requirements of turkey poults, R. J. Evans. (Wash Expt. Sta.). *(Poultry Sci., 22 (1943), No. 3, pp. 266–267, illus. 1)*—The choline requirements of poults for the prevention of perosis was between 0.18 and 0.25 percent of the ration, being estimated at 0.19 percent. The perosis score (E. S. R., 88, p. 237) exhibited a straight-line decrease between 0.09 and 0.18 percent choline as estimated by methods described above.

Fiber and protein in turkey rations: Substitutes to meet wartime needs, T. T. Milby, R. Penquite, and R. B. Thompson *(Oklahoma Sta. Cir. 111 (1943), pp. 8)*.—Various wartime feeds recommended for turkey rations, with comments on deficiencies likely to be encountered.

DAIRY FARMING—DAIRYING

Feeding dairy cattle, T. W. Gullickson *(St. Paul: Webb Book Pub. Co., 1943, pp. 223+, illus. 15)*.—General directions for compounding rations and feeding, with special reference to requirements and roughages for dairy cattle.

Meeting the protein shortage on dairy farms, F. B. Morrison. ([N. Y.] Cornell Expt. Sta.). *(Farm Res. [New York State and Cornell Stas.], 9 (1943), No. 2, pp. 3–4)*.—In 86 lactations the kind or quality of protein was of little practical importance in any ordinary grain mixture for dairy cows, even when little of the roughage was legume forage. The lesser importance of protein quality in the ruminant's ration than in the ration of the nonruminant was apparently due to bacteria in the rumen, which made good quality protein from other sources of N and further along in the digestive tract they themselves were digested.

Soybean-millet molasses silage for dairy cows, M. H. Berry and K. L. Turk *(Maryland Sta. Bul. A13 (1942), pp. 351–360+, illus. 2)*.—There was no significant difference in favor of corn silage or soybean-millet silage when fed with grain and alfalfa hay to two groups of 10 and 8 cows by the double reversal method in each of 2 yr. When adjusted to 4 percent fat the cows averaged 32.02 lb. of milk per day on the soybean-millet silage and 32.38 lb. on corn silage. Weight was better maintained on the corn silage, which was also more palatable than the soybean-millet silage. There was no difference in the flavor of the milk. The reversal trials were of 7 weeks' duration.

Comparison of molasses-alfalfa silage and phosphoric acid-alfalfa silage as feeds for the milking cow, W. A. King *(New Jersey Stas. Bul. 704 (1943), pp. 35, illus. 3)*.—Although differences were not great, molasses-alfalfa silage was somewhat more palatable and economical than phosphoric acid-alfalfa silage when fed with a grain and hay ration for dairy cattle in a 20-week test. Both of these silages were more economical and produced greater amounts of milk than similar rations with corn silage. The phosphoric acid-alfalfa silage alone produced slightly but not significantly more milk than molasses-alfalfa silage alone. However, the cows on phosphoric acid-alfalfa silage lost an average of 65 lb. per head in spite of Ca additions as 150 gm. of limestone per day. Studies of the physiological condition of the cows on the silages showed that corn silage and molasses-alfalfa silage caused no significant changes in the blood or urine. The phosphoric acid-alfalfa silage-fed cows showed an increase in the urinary ammonia and a decrease in the pH of the urine. The inorganic P in the blood plasma showed an increase of 1 to 3 mg. percent as a result of the phosphoric acid silage feeding. In eight digestion trials of 14 and 21 days' duration the apparent digestibility of the crude protein by cattle fed alfalfa silage preserved with phosphoric acid was greater than that of silage preserved with molasses, but the opposite condition was true for the apparent digestibility of the dry matter, ether extract, and N-free extract. A collection period of 14 days proved adequate in these studies. It was necessary to correct the volatile acid and bases of the feces. In general, cows fed the alfalfa silages showed good N retention, but those receiving phosphoric acid silage with limestone gave a negative N balance of 13 gm. per day. Without limestone a strong positive N balance was produced. In most cases 91 percent or more of the Ca and 88 percent of the P in the rations were excreted in the feces. The studies were carried on with three groups of five cows each receiving corn silage, molasses-alfalfa silage, and phosphoric acid-alfalfa silage with corn and oats as concentrates, and with two groups of three cows each receiving alfalfa silages of the two types as the sole feeds.

Raising dairy calves on dry meal (preliminary report), J. O. TRETSVEN (*Montana Sta. Cir. 169 (1943), pp. 4*).—By careful management good bull and heifer calves were raised on dry rations with dry skim milk. A ration in which 150 lb. of dried buttermilk replaced the higher priced and less available dry milk gave good results. Further reduction in cost of the meal was achieved by reducing the amount of dried milk and increasing soybean and linseed meal without seriously interfering with growth.

The effect of thiamin feeding upon milk and fat production, J. K. LOOSLI and H. L. LUCAS. (Cornell Univ.). (*Jour. Dairy Sci., 26 (1943), No. 4, pp. 291–294*).—No significant effects of thiamin fed at the rate of 300 μg. per pound of total digestible nutrients in a low-fat ration were noted on the milk or fat production of dairy cows. The study was carried on by the double reversal method in three periods of 5 weeks each with four medium-producing cows. The ration consisted of timothy hay, dried beet pulp, and a concentrate of solvent-extracted feeds containing 1 percent of ether extract. The thiamin was fed to two of the cows during the first and third periods and to the other two cows during the second period.

Freshening date changes of cows in Iowa Dairy Herd Improvement Associations, C. Y. CANNON and E. N. HANSEN. (Iowa Expt. Sta.). (*Jour. Anim. Sci., 2 (1943), No. 2, pp. 112–117, illus. 2*).—Although McDowell (E. S. R., 47, p. 580) indicated that cows freshening in the fall or early winter had higher milk and butterfat production records and made larger incomes over feed costs than those freshening in the spring and summer, little change was found in the percentages of 153,610 cows in Iowa Dairy Herd Improvement Associations from 1926 to 1941 and the calving months of 157 cows in the Iowa State College herd. The percentages calving in the different seasons in the Iowa Dairy Herd Improvement Associations and the college herds were winter 30.0 and 26.7, spring 19.8 and 23.3, summer 14.1 and 21.6, and fall 36.1 and 28.4, respectively. The calving interval among the Iowa Dairy Herd Improvement Association cows was 451 days, which was similar to 446 days for the Iowa State College cows.

"Iowa dairymen evidently have made an effort to freshen their cows in the fall, but calving intervals longer than 12 mo. cause some calving dates to shift to other seasons. Economic factors other than high milk yields probably hinder any shifting of cows whose calving dates occur in other seasons back to fall calving."

Bactericidal action of radiant energy from special types of lamps on organisms found on dairy utensils and equipment, R. B. Arnold and O. F. Garrett. (N. J. Expt. Stas.). (*Jour. Dairy Sci., 26 (1943), No. 4, pp. 309–320, illus. 7*).—Continuing studies of the bactericidal action of ultraviolet radiation by methods of Rentschler et al. (E. S. R., 85, p. 600), the organisms growing on the surface of milk bottles, pasteurizers, and dairy utensils were greatly reduced within a short time by the radiant energy from two lamps used in the study. The logarithmic order of death of *Escherichia coli* and *Staphylococcus albus* cultured on Petri dishes occurred after the early part of the exposure period had passed. The bactericidal rate decreased with increased distance of the lamp, but not in proportion to the square of the distance. The bactericidal rate from two energy lamps was not greatly affected by the angle of incidence up to 50°; low temperatures, provided the lamp remained at room temperature; or films of water from 5 to 10 mm. deep over growing organisms. The destructive power of radiation was decreased by opaque substances such as milk and agar, increased concentration and clumping of the organisms, and unclean, rough, cracked, and shaded surfaces.

The flavor of market milk as influenced by pasteurization, J. A. Nelson (*Montana Sta. Bul. 410 (1943), pp. 11, illus. 5*).—The organoleptic scoring by two experienced milk judges of 151 samples of Holstein and Jersey milk when raw and 151 after pasteurization at 143° F. for 30 min. and holding for 8, 32, and 56 hr. at 38° showed that no flavor defects developed during storage if there were none originally present in the raw samples. Feed and foreign flavors were intensified during storage. Untreated pasteurized samples had a slightly cooked flavor after 8 hours' storage and an oxidized flavor after 32 hr., which became more pronounced as the storage period was lengthened. A foreign flavor due to paradichlorobenzene masked any cooked or oxidized flavor developing in storage. Pasteurization did not eliminate the foreign flavor, but it prevented it from becoming more intense during storage. Because pasteurized milk may develop an oxidized flavor which intensifies with age, milk should be delivered promptly after pasteurization.

Nature of the material in milk responsible for the modified Whiteside test for mastitis, H. O. Dunn, J. M. Murphy, and O. F. Garrett. (N. J. Expt. Stas.). (*Jour. Dairy Sci., 26 (1943), No. 4, pp. 295–303, illus. 2*).—Leucocytes seemed to be directly or indirectly responsible for the Whiteside reaction[3] in mastitic milk, and it was postulated that the protein material of leucocytes in mastitic milk reacts with NaOH to form a gelatinous mass similar to that formed with nucleic acid from animal cells. The intensity of the Whiteside reaction of infected milk from infected cows was related to the leucocytes present in different separations of milk, which were greater in gravity-separated than centrifugal-separated cream, and the leucocytes clung more closely to the former. Curves were closely parallel for the intensity of the Whiteside reaction, number of leucocytes, and the amount of separator slime in the milk from an infected cow. Comparable tests are reported for milk from a noninfected individual. Positive tests were obtained with sodium hydroxide when equine or bovine leucocytes were added to negative or heated and cooled milk.

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[3] W. H. Whiteside. Canad. Pub. Health Jour., 30 (1939), No. 1, p. 44, illus, 1.

Manganese in cows' milk. J. G. Archibald and H. G. Lindquist. (Mass. Expt. Sta.). (*Jour. Dairy Sci., 26 (1943), No. 4, pp. 325–330*).—In a second season's study (E. S. R., 86, p. 237) with eight cows, adding manganese sulfate to the ration more than doubled the amount in the milk. On the control ration from December to April the manganese per liter in the milk averaged 21.9 μg., but with the feeding of manganese sulfate it was increased to 53.6 μg. during the first 3 mo. and 74.5 μg. during the second half of the season. The amounts of manganese given were 2 oz. per day per cow. Although the manganese content of the milk was increased it did not inhibit the development of oxidized flavor, and the flavor scores of the milk were generally lower for cows receiving the supplemental manganese.

The development of a positive phosphatase test in refrigerated, pasteurized cream, F. W. Barber and W. C. Frazier. (Univ. Wis.). (*Jour. Dairy Sci., 26 (1943), No. 4, pp. 343–352*).—Strains of *Bacillus cereus* and *B. mesentericus* were able to grow and produce phosphatase at 4° and 10° C. in pasteurized cream. Commercially pasteurized creams were shown to change from negative to positive in phosphatase tests, even though refrigerated. When the temperature or duration of the pasteurization period was increased, phosphatase was produced but at a slower rate. In cream the bacterial phosphatase organisms withstood heat treatments as high as 76.7° for 30 min., while milk phosphatase production was eliminated in 30 min. at 62.8°. Accordingly, the two types could be differentiated. The studies were carried on with samples of raw cream from Wisconsin, New York, Vermont, New Hampshire, and Massachusetts, which were heated to different temperatures and held for different periods, with storage at 4° and 10°. It was noted that the cream was less suitable as a medium for inoculation and phosphatase production as pasteurization was increased from 30 min. at 61.7° to steaming for 2 hr. The organisms grew, but they did not produce phosphatase. The greatest activity of these organisms occurred at pH 8.77 and 8.82.

Twenty-eighth annual report of the creamery license division, T. H. Binney (*Indiana Sta. Cir. 278 (1942), pp. 15*).—Data are given on testers' licenses issued and other pertinent information (E. S. R., 87, p. 414).

Butter making during hay feeding season, "50–45–40" method, G. H. Wilster, R. E. Stout, R. W. Stein, J. R. Haag, and I. R. Jones (*Oregon Sta. Bul. 414 (1942), pp. 48, illus. 6*).—Results are presented of the effects of different manufacturing processes on the chemical and physical properties of butter from cream produced in the fall and winter months from irrigated alfalfa areas, in continuation of studies previously noted (E. S. R., 85, p. 245). It seemed evident as a result of these findings, which included 142 churnings in 6 cooperative creameries, that the cream after pasteurization should be cooled slowly to about 50° F. When cold wash water (45°) was used the butter had an excellent body and texture with good spreading quality. The freshly packed molds and cubes of butter were best kept in a refrigerator maintained at 40°. In the production of butter in 383 churnings special attention was given to the effects of flash and holding pasteurization of the cream, surface and vat cooling, cooling and holding the cream at different temperatures and for different intervals, variations in temperatures of the wash water, and speeds of working on crumbling, stickiness, printability, spreading quality, and moisture loss of the butter. The characteristics of the butter were ascertained at Corvallis, by a representative of the Idaho Station at Moscow, Idaho, and by a Federal grader at Portland, Oreg.

Action in cheese ripening of an enzyme preparation from chicken proventriculi, including manufacture of a new type cheese—Savoureux, F. J. Babel, G. F. Stewart, and B. W. Hammer. (Iowa Expt. Sta.). (*Jour. Dairy*

Sci., 26 (1943), No. 4, pp. 331–336, illus. 1).—A milk-coagulating enzyme was made from water extracts of fresh frozen and dried stomachs of slaughtered chickens. The enzyme also showed proteolytic properties in addition to the marked coagulating powers. With a modified Edam process, a type of cheese that had distinct properties was prepared from skim milk. In view of the commercial possibilities, the name Savoureux is suggested.

Home and factory manufacture of cottage cheese, P. S. Lucas (*Michigan Sta. Cir. 185 (1943), pp. 20, illus. 7).*—A revision of Circular 97 (E. S. R., 56, p. 275) dealing with the manufacture of cottage and cream cheeses at home and in the factory, with recipes for modified types.

The calcium and phosphorus content of commercially made cottage cheese, O. F. Garrett. (N. J. Expt. Stas.). (*Jour. Dairy Sci., 26 (1943), No. 4, pp. 305–308).*—The mean composition of 102 samples of cottage cheese from 11 companies varied widely with the manufacturers. The total solids varied from 14.89 to 28.71 percent, the ash from 0.62 to 2.31 percent, the calcium from 0.046 to 0.106 percent, and the phosphorus from 0.172 to 0.359 percent. Variations in the composition of the cheese, ratios of calcium: ash, calcium: phosphorus, and phosphorus: ash, and grams of calcium and phosphorus per pound were given for the cheese from each company. Cottage cheese is considered a good source of calcium and phosphorus for the human diet.

Victory ice cream, C. D. Dahle and D. V. Josephson. (Pa. State Col.) (*Ice Cream Rev., 26 (1943), No. 10, pp. 24–25, 50).*—In a preliminary study of oat and wheat flour in the ice cream mix it was found that from 1 to 2.5 percent of these flours improved the body and texture of the product made from them. When different amounts of oat flour (Avenex) up to 2.5 percent were added the body and texture were improved, but more than 1.5 percent produced a definite cereal flavor, and in vanilla ice cream excess vanilla flavoring was needed.

VETERINARY MEDICINE

Veterinary bacteriology, I. A. Merchant (*Ames: Iowa State Col. Press, 1942, [2 ed., rev.], pp. 640+, illus. 135).*—A limited revision of this work of four parts (E. S. R., 84, p. 813), in which the chapter on the genus *Streptococcus* has been revised most extensively. The author was assisted by R. A. Packer in the preparation of the section relating to mastitis streptococci, by S. H. McNutt in the revision of the *Brucella*, and by L. H. Schwarte in the section on filtrable virus diseases. Each chapter is accompanied by a list, or lists, of references to the literature.

The adequacy of improved stock diets for laboratory animals, C. A. Slanetz (*Amer. Jour. Vet. Res., 4 (1943), No. 11, pp. 182–189).*

The infectious diseases of domestic animals, with special reference to etiology, diagnosis, and biologic therapy, W. A. Hagan (*Ithaca, N. Y.: Comstock Pub. Co., 1943, pp. 665+, illus. 146).*—Part 1 (pp. 1–74) of this work of 44 chapters is devoted to the mechanisms of infection and resistance, part 2 (pp. 75–330) to the pathogenic bacteria, part 3 (pp. 331–351) to bacterialike pathogenic organisms of uncertain classification, part 4 (pp. 353–380) to the pathogenic fungi, part 5 (pp. 381–493) to the pathogenic protozoa, and part 6 (pp. 495–654) to the viruses.

Life history of Sarcosporidia, with particular reference to Sarcocystis tenella, J. W. Scott (*Wyoming Sta. Bul. 259 (1943), pp. 63).*—The present status of knowledge of the subject, based upon a review of the literature, accompanied by a nine-page list of references, and an extensive series of experiments and observations by the author extending over a period of more than 25 yr., is brought together. The findings have led to the following summary of the life history of *S. tenella:* "(1) A sarcocyst of *S. tenella* begins as a one-celled ameboid parasite within a striated muscle cell. (2) By growth and repeated cell division a young sarcocyst develops, consisting of a number of round cells or sporoblasts, each with a nucleus surrounded by cytoplasm. Rarely, it appears that the sporoblasts at this stage may break up, wander out, and start new infections in other muscle cells. (3) As development progresses the sporoblasts continue to divide and all become enclosed in a cyst wall derived primarily from the muscle and connective tissues of the host. (4) The sporoblasts are transformed into ellipsoid and then into banana-shaped spores. (5) In old, large sarcocysts the centrally located spores degenerate and disappear. The cyst walls of many, perhaps all, mature sarcocysts rupture and the spores find their way into the blood stream. (6) The next stage is somewhat uncertain. I have found the spores in nasal secretions and in the feces, and, though I have not seen them in urine, it has been conclusively proved that the feces of infected sheep contain an infective stage which, by contaminating food, transmits the parasite to a new sheep host. (7) It has been experimentally proved that no intermediate host is necessary. (8) How, in what form, or by what path, the parasite gets from the alimentary canal to the striated muscle cell is a blank, so far as our observations go. This requires an approximately 6 weeks' period. The work of others on this point is so inconclusive, uncertain, unconvincing, and so lacking in genetic continuity that any opinion would be based on unsatisfactory evidence."

Studies and observations on the laboratory diagnosis of anthrax, C. D. STEIN. (U. S. D. A.). (*Vet. Med., 38 (1943), No. 4, pp. 130–139, illus. 7*).—Description is given of a practical procedure for carrying out laboratory examination for anthrax, the typical colony formation on plain agar plates of cultures made direct from blood or spleen specimens, and certain other characteristics that assist in the identification of *Bacillus anthracis* and its differentiation from anthraxlike organisms. The use of phenol to facilitate the recovery of anthrax from material contaminated with non-spore-bearing organisms, especially those of the spreader type, is the method of choice.

Determination of the number of Brucella abortus organisms required to infect guinea pigs and cattle, L. S. HUTCHINGS and I. F. HUDDLESON. (U. S. D. A. coop. Mich. Expt. Sta.). (*Amer. Jour. Vet. Res., 4 (1943), No. 11, pp. 155–161*).—The authors have prepared a suitable suspending or diluting fluid for making plate counts of *Brucella* from 0.1 percent tryptose and 0.5 percent sodium chloride in distilled water. The pH after sterilization was 6.9. "Standardization of bacterial suspensions by means of the photelometer gave consistent and reproducible plate counts. Guinea pigs were readily infected with *B. abortus* and *B. suis* in very small numbers. Ten organisms were sufficient to produce infection in most of the guinea pigs. Continued passage of *B. abortus* through guinea pigs resulted in an increase in virulence of all cultures for guinea pigs. B. A. I. strain 19 exhibited the lowest virulence of any culture of *B. abortus* studied. Susceptible pregnant heifers were readily infected with approximately 5,000,000 viable *B. abortus* organisms deposited in the conjunctival sac. Smaller exposing doses were not tried."

In vivo activity of streptothricin against Brucella abortus, H. J. METZGER, S. A. WAKSMAN, and L. H. PUGH. (N. J. Expt. Stas.). (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 2, pp. 251–252*).—Tests were made of streptothricin, an antibiotic substance obtained from a soil species of *Actinomyces*, against *B. abortus*, both in vitro and in vivo, with favorable results. Experiments with incubating eggs established that the toxicity of streptothricin is low enough to make possible the administration of doses sufficient to destroy *B. abortus* in the living tissues. Studies with guinea pigs indicated that streptothricin offers considerable promise as an antibiotic agent against brucellosis in animals.

The occurrence and distribution of Salmonella types in the United States, P. R. Edwards and D. W. Bruner. (Ky. Expt. Sta.). (*Jour. Infect. Diseases, 72 (1943), No. 1, pp. 58–67*).—Report is made of a survey of *Salmonella* infections in the United States, based on the antigenic analysis of 3,000 cultures from 2,285 outbreaks of infection in man and animals. Fifty-nine *Salmonella* types were encountered and their zoological distribution and frequency of occurrence are noted. *S. pullorum* occurred not only in fowls, but was also recognized in cultures from swine, foxes, mink, and man.

Control of cattle-parasitic and free-living nematodes by soil fumigation with methyl bromide, L. E. Swanson and A. L. Taylor. (Fla. Expt. Sta. and U. S. D. A.). (*Helminthol. Soc. Wash. Proc., 10 (1943), No. 1, pp. 1–3*).—In preliminary tests of the action of the methyl bromide, which is extraordinarily efficient when used as a soil fumigant against the root knot nematode *Heterodera marioni* (Cornu) Goodey, it was found to have killed all of the cattle-parasitic and free-living nematodes to a depth of at least 12 in. in soil that was fumigated under a paper cover at the rate of 1 lb. of the chemical to 63 sq. ft. of soil.

Fumigation of soil with methyl bromide as a means of destroying infective stages and intermediate hosts of some internal parasites of mammals, J. S. Andrews, A. L. Taylor, and L. E. Swanson. (U. S. D. A. and Fla. Expt. Sta.). (*Helminthol. Soc. Wash. Proc., 10 (1943), No. 1, pp. 4–6*).—In the experiments here reported the eggs of the large roundworm *Ascaris lumbricoides* were found very resistant to ordinary chemicals and may remain viable in soil for several years. The killing of earthworms, the intermediate hosts of the swine lungworm, also appears significant since infected earthworms may survive in soil for as long as 4 yr. The destruction of infective larvae of *Strongyloides* and *Oesophagostomum*, as well as immature larvae within the kidney worm eggs, suggests that the infective larvae of strongylid parasites of other animals may also be killed by methyl bromide. Destruction of coccidia indicates that methyl bromide may also be useful for control of protozoan parasites.

The occurrence of swine ascarid eggs in the intestinal contents and in the droppings of wild rats. H. E. Zimmerman, Jr. (U. S. D. A.). (*Helminthol. Soc. Wash. Proc., 10 (1943), No. 1, pp. 25–26*).—It is pointed out that in view of the findings here presented the possibility that wild rats may occasionally be responsible for dissemination of ascarids and other parasites of livestock under farm conditions should be kept in mind.

Inoculations of Trichomonas foetus (Protozoa) in guinea pigs, B. B. Morgan. (Wis. Expt. Sta.). (*Helminthol. Soc. Wash. Proc., 10 (1943), No. 1, pp. 26–29*).—In continuation of the author's work with *T. foetus* (E. S. R., 88, p. 384) the results of inoculations of this parasite in 125 guinea pigs are reported. Sixty-two animals, divided into 3 proups, were inoculated intraperitoneally with (1) washed *T. foetus* suspended in 0.7 percent saline with a concentration of 10 million living organisms per cubic centimeter or (2) the liquid portion of 72-hr. *T. foetus* cultures composed of buffered saline-citrate solution with 5 percent bovine serum. The concentration was approximately 3 million living organisms per cubic centimeter and sterile trichomonad pyometra material from an infected cow with a count of 1.5 million living organisms per cubic centimeter. Only 3 animals became infected. Twenty guinea pigs were refractory to subcutaneous injections of *T. foetus* in pure culture, while 12 guinea pigs were positive to subcutaneous injections of sterile trichomonad pyometra material from an infected cow. Abscesses remained positive for *T. foetus* up to 42 days. Of 30 guinea pigs inoculated vaginally with bacteria-free trichomonad pyometra material, only 2 were positive for 5 days.

Sulfaguanidine for cecal coccidiosis, J. R. Beach. (Univ. Calif.). (*Vet. Med., 38 (1943), No. 4, p. 147*).

Liver cirrhosis and choline, R. W. Engel. (Ala. Polytech. Inst.). (*Fed. Proc. [Fed. Amer. Socs. Expt. Biol.], 2 (1943), No. 1, p. 62*).—Hepatic cirrhosis was found to be produced consistently in 9 weanling rats fed a choline-deficient diet containing 20 percent protein and 6 percent fat. That choline deficiency was responsible for the cirrhosis was adequately demonstrated, it having been entirely prevented in 10 rats receiving the same diet plus 20 mg. of choline chloride each daily throughout the experiment.

Protective action of sulfanilamide against liver cirrhosis from chronic poisoning with carbon tetrachloride, J. C. Forbes, B. E. Leach, and G. Z. Williams (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 1, pp. 47–48*).—It was found that the administration of sulfanilamide to rats retards the development of liver cirrhosis from chronic poisoning with carbon tetrachloride. A number of vitamins and amino acids were tested for possible protective action in acute poisoning experiments, but none was found to increase the animal's tolerance. Administration of para-aminobenzoic acid did not inhibit the protective action of sulfanilamide against acute poisoning by carbon tetrachloride.

Sylvatic plague studies, I–III (*Jour. Infect. Diseases, 69 (1941), No. 1, pp. 29–31, illus. 4; 72 (1943), No. 1, pp. 18–30, illus. 15; pp. 68–76, illus. 1*).—In parts 1 and 2, J. R. Douglas and C. M. Wheeler give a description of a convenient individual mouse jar for use with small experimental animals and an account of the fate of *Pasteurella pestis* in the flea, respectively. In part 3, F. C. Evans, C. M. Wheeler, and J. R. Douglas report upon an epizootic of plague among ground squirrels (*Citellus beecheyi*) in Kern County, Calif.

Toxoplasmosis in wild rats, T. L. Perrin, G. D. Brigham, and E. G. Pickens (*Jour. Infect. Diseases, 72 (1943), No. 1, pp. 91–96, illus. 4*).—The authors have demonstrated the presence of spontaneous *Toxoplasma* infection in wild rats trapped in Savannah, Ga. The incidence of the infection in these rats, on the basis of this study, is 8.7 percent.

Production of penicillin, S. W. Challinor (*Nature [London], 150 (1942), No. 3815, p. 688*).

Newer methods in the use of phenothiazine (*North Amer. Vet., 24 (1943), No. 3, pp. 147–152*).—Presented with a list of 22 references to the literature.

The poisoning of livestock by cacao products, F. Blakemore and G. D. Shearer (*Vet. Rec., 55 (1943), No. 15 p. 165*).—The authors have found ample evidence that cacao husks and meal may have a toxic effect on animals when fed in quantity. Horses, swine, and poultry appear to be particularly susceptible. The toxic effects of cacao shells or meal are due to the presence of theobromine. However, these products do not seem very acceptable to animals and are not taken very well when first mixed with the food. Since theobromine is present in varying amounts in cacao products depending on previous treatment, etc., it is suggested that neither cacao husks nor meal be fed to farm animals without previous analysis and in any case should not be given in quantity.

The economic and nutritional importance of bovine hepatic disturbances, L. D. Frederick (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 794, pp. 338–345*).

Experimental alteration of thyroid function in cattle, J. F. Bullard and F. N. Andrews. (Ind. Expt. Sta.). (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 794, pp. 376–381, illus. 2*).—A study was made of this condition in 11 purebred beef and 1 purebred Holstein-Friesian steers. "The thyroid was most satisfactorily removed through a 6-in. skin incision made at right angles to the midline and approximately 1 in. posterior to the arch of the cricoid cartilage. The gland was bluntly dissected, the large artery entering each thyroid lobe at its anterior-lower border carefully exposed and doubly ligated, and the thyroid excised. The average cumulative daily gain during the first 6 postrecovery weeks was 2.6 lb. and had decreased to 2 lb. at the end of 20 weeks. A histological study of the thyroid tissue recovered at the time of operation and of the remnants obtained at slaughter showed that marked hypertrophy and hyperplasia occurred following the operation."

The effect of chemotherapeutic agents on the normal bovine mammary gland.—I, The effect of Novoxil, W. G. Andberg and F. J. Weirether. (Minn. Expt. Sta.). (*Amer. Jour. Vet. Res., 4 (1943), No. 11, pp. 134–142, illus. 10*).—Report is made of a series of three experiments in which a total of 18 apparently normal quarters of 8 cows were infused with Novoxil to determine its effects upon apparently normal lactating mammary glands. The infusions produced a condition simulating acute mastitis. The glands became enlarged, tender, and firm; the milk became abnormal in consistency; and the percentages of the milk chlorides increased and those of the lactose decreased. The findings in the udders of 5 of the 6 cows slaughtered 4 weeks after infusion are described. No apparent permanent changes in the udder were noted macroscopically nor microscopically in 2 cows 4 and 17 mo. after infusion with Novoxil (1 yr. of age).

Chronic bovine mastitis: An attempt to discover the relationship between clinical symptoms and infection with Streptococcus agalactiae, A. J. Kennedy (*Vet. Rec., 55 (1943), No. 4, pp. 45–46*).—Sixty-five quarters originally negative to a bacteriological test for mastitis were examined clinically twice a day for 143 days and were also examined bacteriologically at approximately weekly intervals. In the quarters (7) which became permanently affected with mastitis, clinical changes were observed at 20 percent of the clinical examinations carried out prior to the first indication of bacterial infection. In those quarters which were negative or showed merely transient infections (58), only 5.5 percent of the examinations showed any clinical abnormality. It is suggested that these results, though few, tend to show that clinical injury precedes infection with *S. agalactiae*.

The distribution of Trichomonas foetus in the preputial cavity of infected bulls, D. M. Hammond and D. E. Bartlett. (U. S. D. A.). (*Amer. Jour. Vet. Res., 4 (1943), No. 11, pp. 143–149, illus. 1*).—The distribution of *T. foetus* in the bovine preputial cavity was determined by examination of one naturally infected and three experimentally infected bulls a total of 15 times under epidural anesthesia. Trichomonads were usually found in highest numbers on the portion of the glans penis not including the galea glandis, with relatively lower numbers scattered over the remainder of the penis and prepuce. Variations in general level of numbers and in distribution of trichomonads were noted both in different individuals and in the same individual at different times. All flushings from the lower urethra were negative.

The value of the tuberculin test in cattle affected with extensive lesions of tuberculosis, T. M. Doyle (*Vet. Jour., 99 (1943), No. 3, pp. 64–69*).—In experiments with the tuberculin test on advanced cases of tuberculosis it was found that only 1 animal of 25 failed to react. It is concluded that the frequency with which cattle affected with extensive lesions of the disease fail to react to modern synthetic medium tuberculin is much overstated. Anergic animals undoubtedly occur, but the number is small, and experience in America has proved that their presence has little influence on the eradication of the disease. They are usually aged and emaciated, facts that single them out for clinical examination.

Preliminary observations on hexachloroethane for controlling the common liver fluke, Fasciola hepatica, in cattle, O. W. Olsen. (U. S. D. A.). (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 795, pp. 433–436*).—Commercial hexachloroethane of technical grade mixed with powdered bentonite and water at the rate of 500 gm. of hexachloroethane, 50 gm. of bentonite, and 750 cc. of water to make 1,000 cc. of suspension having 1 gm. of the drug to 2 cc. of the mixture was administered with a drench syringe. "Cattle received 20 cc. of the suspension (10 gm. of hexachloroethane) per 100 lb. of live weight. Fasting before and after treatment was not necessary. When the cattle were given the hexachloroethane-bentonite-water suspension at the rate of 20 cc. per 100 lb. of live weight, no ill effects were manifested. Doses up to 200 cc. (100 gm. of hexachloroethane) did not produce symptoms of toxicity. Of the 209 infected animals treated, 191, or 91 percent, showed no liver fluke eggs when examined from 2 to 3 weeks later. Of 10 animals that were repeatedly examined from 5 to 20 weeks after treatment, 1 showed an infection of 4 eggs per gram of feces. This occurred after 5 mo. on infested pastures. Post-mortem examinations were made on 5 animals infected with liver flukes at the time of treatment. Four of them were negative when examined shortly after treatment; the fifth, which had showed 196 eggs per gram of feces at the time of treatment, appeared to be negative 2 weeks later, but was found to harbor a few flukes when examined post mortem 4 mo. later."

An experiment with sulfaguanidine in the treatment of naturally acquired bovine coccidiosis, D. C. Boughton and L. R. Davis. (U. S. D. A.). (*Amer. Jour. Vet. Res., 4 (1943), No. 11, pp. 150–154, illus. 1*).—Report is made of the results of an experiment in which naturally acquired infections of bovine coccidiosis were treated with sulfaguanidine. Six pairs of calves were subjected to unsanitary conditions conducive to the development of severe infections. The drug was given to 1 calf of each pair at the rate of 30 gm. every other week, each treatment extending over a 3-day period, until totals of 150 or 180 gm. had been administered. The coccidial infections of the treated calves were less severe than those of the controls. Fewer oocysts were discharged by the treated than by the untreated calves. No calf died of coccidiosis in the treated group; two untreated calves developed fatal coccidiosis. Treated and untreated groups differed very little in regard to the prevalence of diarrhea or in growth. It is concluded that the results obtained under the severe conditions of the experiment demonstrate the effectiveness of sulfaguanidine in reducing the severity of bovine coccidiosis contracted in heavily contaminated quarters.

Studies on sulfathiazole administration to cattle, E. L. Stubbs, I. Live, and M. R. Gardiner, Jr. (*North Amer. Vet., 24 (1943), No. 3, pp. 161–166, illus. 2*).—In studies of the effect of sulfathiazole on six cows of the dairy type, varying from 4 to 7 yr. of age, each received 7 gm. per 100 lb. of body weight daily at 8-hr. intervals during the initial 5 days. In the absence of noticeable toxic effects the quantity of the drug was increased to 8 gm. per 100 lb. of body weight daily, divided into five doses at 4-hr. intervals with an 8-hr. pause during the night. "This dosage was maintained for 8 days, toward the end of which undesirable effects began to appear in some animals. The drug was then reduced to 6 gm. and finally to 5 gm. per 100 lb. of body weight daily. One cow was treated for 12 days, one for 13 days, one for 14 days, and two for 34 days. The sixth cow was treated for 11 days, at which time she could not get up, and died 1 day later due to the severe toxic effects of the drug. The highest level of free sulfathiazole in the blood of any of the cows, namely, 13.5 mg. per 100 cc., was observed shortly before death in the cow which died.

This death must be attributed to faulty elimination of the drug in the urine, as evidenced by severe kidney damage observed at necropsy and confirmed by microscopic examination. The highest level, in the other five cows, was 5.28 mg. per 100 cc. of blood, obtained in one cow on the fifth day of administration. Blood samples obtained at hourly intervals over a period of 8 hr., covering two dose periods, did not show any appreciable change in the concentration of free sulfathiazole in the blood. Thus, although the quantity of free sulfathiazole was low it seemed to be maintained at a constant level when the drug was administered at 4-hr. intervals.

"The toxic effects varied in the different animals. They all showed a rise in temperature to a greater or lesser degree, two suffered from anorexia, two developed a general urticaria, which was most pronounced in the region of the hind legs and the udder. One cow, although showing no lesions, was very sensitive to touch in the region of the udder, and another animal developed a twitching of the muscles in the flank and hind quarters. The white cell counts showed a tendency to decrease during the course of treatment, while in the differential counts the precentage of neutrophiles fluctuated, showing a noticeable increase in three, while in one cow complete neutropenia was observed at one point."

Isolations of Bacillus subtilis from actinobacillosis-like lesions in cattle and sheep, L. B. Schweiger, D. Trainer, and D. F. Eveleth. (Ark. Expt. Sta.). (*Amer. Jour. Vet. Res., 4 (1943), No. 11, pp. 127–133, illus. 8*).—Record is made of the isolation of *B. subtilis* from cattle and sheep tissue at the station. The source and significance of the isolation of this organism are discussed, and a description is given of cultures freshly isolated from animal tissue and of old laboratory cultures, together with the pathology of the disease produced.

Urinary calculi in sheep, W. M. Beeson, J. W. Pence, and G. C. Holm. (Idaho Expt. Sta.). (*Amer. Jour. Vet. Res., 4 (1943), No. 11, pp. 120–126, illus. 2*).—It was found that experimental diets high in linseed and cottonseed meal, calcium, magnesium, or calcium and phosphorus fed to wether lambs, with and without an adequate source of vitamin A, did not lead to the formation of urinary calculi within 150 to 160 days. Elemental sulfur or added silica did not lead to any observable effects whatever. Vitamin A deficiency was eliminated from having any effect on the formation of urinary calculi under conditions observed in this study. Under certain conditions, wheat bran was found to lead to the formation of urinary calculi. Individual variation in the absorption and excretion of dietary mineral elements was found to be worthy of important consideration in the etiology of urinary calculi formation. The occurrence of an apparently rare siliceous type of calculi observed was attributed to a hyperexcretory state in which urinary magnesium plays an important role in establishing the urinary silica solubility limitations.

Halogeton glomeratus, poisonous to sheep, M. R. Miller. (Nev. Expt. Sta.). (*Science, 97 (1943), No. 2516, p. 262*).—The heavy losses of sheep that occurred near Wells, Nev., in an area where *H. glomeratus* became established in 1935 and spread rapidly over the range, led to a chemical study. Analysis revealed total oxalates in dried samples equivalent to 19 percent anhydrous oxalic acid. Oxalates in water-soluble form were found equivalent to 11 percent anhydrous oxalic acid. It is pointed out that the occurrence of oxalates in species of Chenopodiaceae is well known, but that the quantities found by the author are quite unusual.

Studies on listerellosis.—V, A note on the use of large doses of formalin-killed broth cultures in the experimental prophylaxis of ovine encephalitis, R. Graham and N. D. Levine. (Univ. Ill.). (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 794, pp. 365–367*).—In continuation of these studies (E.

S. R., 84, p. 391) report is made of the value of formalin-killed *Listeria* broth culture administered subcutaneously in preventing spontaneous listerosis in a flock of sheep. One and two doses of 20 cc. each of the bacterin had no protective value, while three doses conferred a relatively weak immunity. It is concluded that vaccination with these doses cannot be recommended.

The sheep parasite problem in Augusta County, W. L. Threlkeld (*Virginia Sta. Bul. 343 (1942), pp. 12, illus. 1*).—In continuation of the investigation of the helminth parasites of sheep in southwest Virginia (E. S. R., 82, pp. 794, 821; 84, p. 818; 85, p. 669) report is made of work from August 14, 1941, to July 18, 1942, in Augusta County, an important sheep-producing county situated centrally in a sheep-producing area. The 44 animals used included 25 untreated, from 4.5 mo. to 1 yr. of age; 11 untreated, all over 1 yr. old; and 8 previously treated miscellaneously. The parasites found present and their locations in the sheep, the number of most harmful parasites in 11 old untreated sheep, and the results of phenothiazine treatments are reported in tables. The results obtained by this study disclose certain facts concerning the nature and degree of sheep parasite infestation in the county and are considered to confirm the results obtained in the earlier work.

The findings have led to the conclusion that "lambs born in January, February, or March remain comparatively free from parasites until sometime in July, hence it is desirable that lambs should be marked by July 1. By the middle of July the large stomach worm . . . is present in sufficient numbers to cause considerable unthriftiness in spring lambs. Hookworms, nodular worms, and large-mouthed bowel worms have begun to appear. From this date on the sheep grower is maintaining not only his lambs, but a vast number of unwelcome guests whose seeds are sown throughout the pastures. July is the month in which two treatments of phenothiazine, at intervals of about 2 weeks, are recommended for the removal of these parasites. By November the small hairworms of the small intestine are very numerous, and the nodular and large-mouthed bowel worms have become firmly established. A large dose of phenothiazine, 0.5 gm. per pound of body weight, is therefore recommended to be given the last of November or in December. A 100-lb. animal should get 50 gm. of phenothiazine. This is twice the amount usually given to old animals regardless of their weight." It might be well to caution against too heavy a dose, for even in sheep which are most tolerant to this chemical unfavorable results have occasionally been reported. "A fourth treatment of 25 gm. per head is recommended sometime between January and April for further control of the small hairworms, nodular worms, and large-mouthed bowel worms. This treatment is not as important as the winter treatment. No treatment is recommended for very young lambs. The seasonal fluctuation of parasites indicates that treatments given between April 1 and July 1 would represent time, money, and materials wasted. This no-treatment period might be considerably lengthened if the treatments recommended for use prior to April 1 have been administered. Animals carried from July 1 into the following spring without treatment, while they may not succumb to parasites, are usually carriers and spreaders of the parasites."

Death losses due to stomach worms among sheep on semi-arid range of New Mexico, H. E. Kemper and N. G. Cobbett. (U. S. D. A.). (*North Amer. Vet., 24 (1943), No. 3, pp. 167–168*).

Overwinter loss of Haemonchus contortus larvae from a sheep pasture, M. P. Sarles. (U. S. D. A.). (*Helminthol. Soc. Wash. Proc., 10 (1943), No. 1, pp. 22–23*).—In work conducted at the Beltsville (Maryland) Research Center it was found that on a pasture contaminated during the summer with small numbers of stomach worm eggs the free-living stages of the parasite died off over winter, rendering the pasture safe for clean stock the next spring. The facts presented give additional support to the growing mass of evidence that pastures which have been rested over winter are relatively, if not completely, free of infective stomach worm larvae. Such pastures are therefore relatively safe for lambs and for treated breeding stock.

Overwinter survival on pasture preparasitic stages of some nematodes parasitic in sheep, K. C. Kates. (U. S. D. A.). (*Helminthol. Soc. Wash. Proc., 10 (1943), No. 1, pp. 23–25*).—Observations conducted at the Beltsville (Maryland) Research Center over the fall, winter, and spring of 1941-42 gave no evidence of survival on pasture of the preparasitic stages of *Oesophagostomum columbianum*, *Cooperia curticei*, and *Bunostomum trigonocephalum;* a very low survival of *Haemonchus contortus* and *Trichostrongylus* spp.; and a relatively high survival of *Ostertagia* spp., *Nematodirus* spp., and *Trichuris ovis*. It was also shown that overwinter exposure of preparasitic stages of sheep nematodes on idle pastures results in a variable reduction in the number of larvae of certain species, and complete destruction of the larvae of others. The general consensus, confirmed by this report, is that the larvae of *Oesophagostomum*, *Cooperia*, and *Bunostomum* do not survive overwintering on pasture, that those *Haemonchus* and *Trichostrongylus* either do not survive or survive in very small numbers depending upon (1) intensity of pasture infections, (2) severity of the winter weather, and (3) length of exposure period, and that the preparasitic stages of *Ostertagia*, *Nematodirus*, and *Trichuris* are the most resistant to the effects of winter weather conditions.

The lungworm Protostrongylus rushi Dikmans, 1937, of the mountain sheep (Ovis canadensis), G. Dikmans. (U. S. D. A.). (*Helminthol. Soc. Wash. Proc., 10 (1943), No. 1, pp. 8–9, illus. 1*).—A description is given of *P. rushi*, found in the bronchi of the mountain sheep and mountain goat (*Oreamnos americanus*) in Yellowstone National Park, Wyo., and first characterized by the author in 1937.

Brucellosis in swine.—I, The interpretation of low titer reactions in experimental and field infections, H. S. Cameron. (Univ. Calif. coop. U. S. D. A. (*Amer. Jour. Vet. Res., 4 (1943), No. 11, pp. 169–172*).—Data are presented on the agglutinin reactions in 21 herds, 11 of which had no recorded breeding difficulties and 10 of which had histories of abortion and sterility. According to the survey a reaction at 1:25 is specific, indicating contact with *Brucella*, and the ultimate objective should be a herd in which all animals are negative in all dilutions. Most of the low-titer reactors following artificial infection became either completely negative or positive 10 weeks after infection, the numbers being approximately equal. Few remained at a low titer. Also presented is a method of eliminating infection from a herd by segregating gilts at weaning and blood-testing them monthly until breeding age. Gilts negative in all dilutions are used as replacement stock for infected herds.

Swine influenza, R. E. Shope (In *Virus Diseases. Ithaca, N. Y.: Cornell Univ. Press, 1943, pp. 85–109*).—This summary of knowledge of swine influenza is presented with a list of 30 references, including reports of the author's investigations (E. S. R., 71, p. 249).

Antigenic relationship of British swine influenza strains to standard human and swine influenza viruses: The use of chicken and ferret antisera in red cell agglutination, N. P. Hudson, M. M. Sigel, and F. S. Markham. (Ohio State Univ.) (*Jour. Expt. Med., 77 (1943), No. 5, pp. 467–471*).

Swine influenza associated with hog cholera, J. P. Scott (*Jour. Bact., 45 (1943), No. 3, p. 303*).—Swine influenza virus has been isolated from atelectatic lesions found in the lungs of pigs infected with hog cholera virus and from an outbreak of cholera associated with pneumonia which developed in pigs previously vaccinated against hog cholera. "Experimental infection of pigs with hog cholera blood containing swine influenza virus produced lesions of cholera and swine influenza. Swine influenza virus was isolated from the blood stream of these pigs by inoculation of the developing chick embryo. Swine influenza virus has not been isolated from the blood of pigs infected with swine influenza alone. Swine influenza virus was injected into the muscles of susceptible pigs; later these animals were injected with hog cholera virus and developed clinical symptoms of swine influenza. Swine influenza virus was isolated from the lung lesions of these pigs. Cholera infection of pigs affected with swine influenza causes the mobilization of swine influenza virus from the lung tissue into the blood stream or from muscular injection to the lung tissue."

The effects of phenothiazine on young pigs, G. LAPAGE (*Vet. Rec., 55 (1943), No. 17, pp. 184–186*).—Following a review of the literature, accompanied by a list of 16 references, eight experiments conducted in continuation of earlier work (E. S. R., 84, p. 390) are briefly reported. It has been found that the typical signs of phenothiazine poisoning of pigs are incoordination and weakness of the hind legs, resulting in reeling gait or, in more severe cases, inability to stand, although the animal will often eat, drink, or nurse if it is held to the trough or mother. There is no clear evidence that the blood is affected by doses that cause these symptoms. These experiments failed to alter the author's earlier conclusion that when pigs 12 weeks of age with an average weight of 35 lb. are given phenothiazine by mixing the total dose for a group of pigs with the total food for that group (mass dose), some of them may show toxic effects from doses as low as 0.2 gm. per pound of live weight. Pigs 3 weeks younger than this and about the same weight have been given individually in their food doses gradually increasing to 1 gm. per pound without ill effects. This seems to indicate that when the mass dose is employed some pigs get more food and therefore more of the drug and suffer toxic effects. When older and heavier pigs were given from 0.1 to 1 gm. per pound of live weight of the drug by mass dose, no toxic effects were seen. Other workers, whose results are summarized, have obtained this result. When the higher doses were given, the pigs seemed to reduce their daily doses by refusing to eat more than a portion of the drugged food each day. When pigs as old as 4.5 mo., weighing 51–98 lb., were given a suspension of phenothiazine in water by the mouth with a syringe at a dose rate of 1 gm. per pound of live weight, toxic results appeared to follow, but these, and the deaths of three or four of these pigs, may have been due to pneumonia caused by inhalation of some of the phenothiazine suspension. In the blood of one of these pigs the hemoglobin and oxygen capacity was reduced to half the normal, although the erythrocyte count was normal. The remaining pig recovered completely. When 1 gm. per pound of live weight of phenothiazine suspension in water was given by stomach tube to pigs aged 8 weeks and weighing from 16 to 21.25 lb., only one out of nine pigs showed toxic effects and these effects were transient.

It appears, therefore, that the responses of individual pigs to phenothiazine, whatever the dose and whatever the age and weight of the pigs, are, like those of individual horses, cattle, and human beings, erratic and incalculable.

Vitamin A deficiency not the cause of joint lesions in horses, G. H. HART, H. GOSS, and H. R. GUILBERT. (Univ. Calif.). (*Amer. Jour. Vet. Res., 4 (1943), No. 11, pp. 162–168*).

The incidence of equine encephalomyelitis, J. R. MOHLER. (U. S. D. A.). (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 795, pp. 454–457, illus. 2*).—A summary of reports on the incidence and mortality resulting from infectious equine encephalomyelitis by States in 1942.

Isolation and properties of the equine encephalomyelitis virus (eastern strain), A. R. TAYLOR, D. G. SHARP, and D. and J. W. BEARD (*Jour. Infect. Diseases, 72 (1943), No. 1, pp. 31–41, illus. 1*).—A description is given of the procedures and related problems in the purification of the specific material associated with the eastern strain of the equine encephalomyelitis virus, together with an account of its general properties.

Electron micrography of the western strain equine encephalomyelitis virus, D. G. SHARP, A. R. TAYLOR, and D. and J. W. BEARD (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 2, pp. 206–207, illus. 1*).—The findings reported indicate that the western strain of the equine encephalomyelitis virus is a spherical or disk-shaped particle of approximately 40 mμ in diameter. Electron-micrographic images reveal an internal structure characterized by a round or oval region of relatively high density surrounded by an enveloping material of less density.

Sensitive fern poisoning in horses, F. S. PRINCE, E. F. WALLFR, A. R. HODGDON, L. V. TIRRELL, and T. G. PHILLIPS (*New Hampshire Sta. Bul. 345 (1942), p. 65*).—Brief report is made of an investigation of the toxic properties of sensitive fern (*Onoclea sensibilis*) for horses. Hay purchased from a section where apparent poisoning had been frequently reported, and which was known to be contaminated with this fern, was analyzed and found to have an average sensitive fern content of 24.25 percent in one lot and 2.7 percent in another. A chemical examination of pure specimens of fern failed to detect any cyanogen content. One horse to which it was fed began to show symptoms of a central nervous disturbance after 6 weeks. The symptoms were progressive from slight incoordination to prostration with partial blindness and paralysis of the alimentary tract. Necropsy revealed icterus, emaciation, paralysis of the stomach, and an edema of right cerebral hemisphere. A histopathological examination of various tissues revealed only acute changes of significance in the brain. These were edema, congestion, and degeneration of the neuron cells with an infiltration of glia cells around the affected neurons. The brain from a field case revealed the same microscopic lesions distributed over both cerebral hemispheres. A second horse to which the hay had been fed developed a hyperesthesia over the entire body after about 10 weeks of feeding. This lasted about 4 weeks and then gradually subsided. Since this was general over the body and no local lesions developed, it is probable that they were the result of lesions of the central nervous system.

Active immunization of dogs against leptospirosis by the use of formalized Leptospira antigen, J. E. ALICATA. (Hawaii Expt. Sta.). (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 795, pp. 472–473*).

Chastek paralysis produced in Oregon mink and foxes by feeding fresh frozen smelt, J. B. LONG and J. N. SHAW. (Oreg. Expt. Sta.). (*North Amer. Vet., 24 (1943), No. 4, pp. 234–237, illus. 2*).—The occurrence of Chastek paralysis during the summers of 1941 and 1942 on Oregon fur farms, where large quantities of Columbia River smelt were fed, is reported. It is shown that the affection may be experimentally produced in both mink and foxes by feeding rations containing 50 percent of fresh frozen smelt. Symptoms are marked and relatively easy to detect in adult mink and in foxes, but diagnosis of the disease in young mink during the summer months is difficult, as affected animals usually die almost instantly, apparently without exhibiting any preliminary recognizable symptoms. Effective treatment includes intraperitoneal injections of 2 mg. of thiamin for mink and 20 mg. for foxes. Smelt should be immediately removed from the diet. Experiments indicate that smelt may be fed safely during the late summer and fall to mink intended for pelting. Feeding schedules may include up to 50 percent fresh frozen smelt fed for 3 consecutive days if on every fourth day smelt is omitted and horse meat substituted in its stead. Feeding smelt only on alternate days would probably be a safer procedure.

Chastek paralysis on an Alberta fox ranch, T. L. Jones (*Canad. Jour. Compar. Med. and Vet. Sci., 7 (1943), No. 4, pp. 112–113*).—Report is made of an outbreak of Chastek paralysis which began 44 days after Pacific coast herring (*Clupea pallasii*) had been added to the daily ration. This species of fish is an addition to the list of those possessing a thiamin-inactivating factor. "More than half the foxes on the ranch showed an impaired appetite before the outbreak was controlled. Five foxes died and 10 were killed in extremis. Over 80 showed nervous symptoms and recovered, but none survived that became paralyzed. A thiamin-rich ration brought the outbreak under control, and within a month the breeding season had begun. The rancher reported that a satisfactory breeding season was experienced and that the outbreak did not appear to have any untoward effect on the potency of his breeding foxes."

Occurrence of ringworm disease and lumpy jaw in the muskrat in Maryland, H. L. Dozier (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 795, pp. 451–453, illus. 2*).—The appearance of the ringworm disease due to *Trichophyton* sp. (probably *mentagraphytes*) in several muskrats on marshes at the field station of the Blackwater National Wildlife Refuge in Dorchester County, Md., is reported. Necropsy revealed a heavy infestation of the liver with both adult and cystic forms of *Taenia taeniaeformis* in the one of the four infected adults that had been introduced from Vermont.

A case of lumpy jaw in an 8-month-old pen-raised black female muskrat was met with at the United States Fur Animal Station. A second case in a 3-year-old examined at the Patuxent Wildlife Disease Laboratory was due to (*Streptothrix*) *Actinomyces bovis* (seu *hominis*). These are said to be the first reported cases of the occurrence of lumpy jaw in the muskrat.

The rabbit as used in disease research: A selected bibliography, including the spontaneous diseases of rabbits, C. M. Herman (*Chicago: U. S. Dept. Int., Fish and Wildlife Serv., 1942, pp. 519+*).—This bibliography, arranged chronologically under subject matter, includes subject and author indexes.

The occurrence of Viannaia viannai Travassos (Nematoda: Heligmosomidae) in opossums in North America, G. Dikmans. (U. S. D. A.). (*Helminthol. Soc. Wash. Proc., 10 (1943), No. 1, pp. 6–7, illus. 1*).—Report is made of the occurrence of *V. viannai* in the small intestine of the opossum (*Didelphys virginiana*) in Maryland and Georgia, this being the first record of the species from the opossum in North America. A brief description is given of the genus and of its type species, together with some figures illustrating the salient morphological characters of this nematode.

Diseases of poultry, edited by H. E. Biester and L. Devries (*Ames: Iowa State Col. Press, 1943, pp. 1005+, illus. 324*).—This work, consisting of a foreword by J. R. Mohler and 40 chapters written by 34 American investigators, brings together the present knowledge of poultry diseases. The concluding chapter, by W. R. Hinshaw (pp. 873–982), is devoted to the turkey.

The etiology, pathology, and prevention of contagious indigestion, E. F. Waller, A. E. Tepper, R. B. Halpin, and H. A. Davis (*New Hampshire Sta. Bul. 345 (1942), pp. 59–61*).—In reporting upon investigations conducted, so-called pullet or blue comb disease, as encountered by the authors, has been found to affect young birds of both sexes while still on the range, pullets in production soon after they are confined to the laying house, and mature hens throughout the entire laying period. In the case of mature hens only an occasional bird is affected every few days, and the disease does not reach epidemic proportions. It is pointed out that there has been some disagreement among poultry pathologists as to whether the symptoms and lesions encountered in these three conditions were all various manifestations of one disease or whether they were different diseases. The present investigation has been with the highly acute fatal type affecting pullets soon after housing. Blood from affected hens was drawn into a sodium citrate solution and injected into incubating eggs. A filtrable agent was obtained from the inoculated eggs which when injected into susceptible chickens produced symptoms and lesions similar to those of spontaneous cases but did not produce the death of the bird.

"Eight- or 9-day-old embryos appear to be the most susceptible. When the virus is introduced into the artificial air cell on the side of the egg an opaque thickened area is usually observed at the point where the inoculum was deposited. The center of this lesion may or may not be necrotic and depressed. From the margin of the lesion there are radiating opaque cordlike thickenings extending along the blood vessels of the chorioallantoic membrane. This produces a lesion that may be best described as 'Medusa head like.' The membranes may also be markedly thickened with edema. The other type of colony observed is circular lesionlike as if the growth had taken place around the border of the drop of inoculum. This type may also have its radiating processes and be accompanied by edema of the membrane. The lesions reach their maximum size after 72 hr. At 96 hr. the embryos are either dead or the lesions tend to localize and the edema disappears. The live embryo at 72 hr. shows some retardation and often hemorrhages into the skin or into the peritoneal cavity. The yolk material present is thinned and watery. The affected chorioallantoic membrane carries the greatest concentration of the infectious agent, but it is also present in the embryo and the embryonic fluid." A characteristic rise in the leucocyte count beginning as early as 24 hr. after inoculation and reaching its peak at about the ninety-sixth hour follows the feeding or injection of the infected embryonic tissues into susceptible chickens, then rapidly returns to normal. The microscopic changes are described. The intestinal contents of inoculated birds have been found capable of reproducing these lesions if fed to another susceptible bird. Any combination of or all of these lesions may be observed in a single bird. All aged birds are not equally susceptible. One-day-old chicks so far have been refractory to intravenous, subcutaneous, and intraperitoneal injections of infective material. Ten- to 14-week-old birds show the highest incidence of visible symptoms following inoculation, but pullets just coming into production show the most severe symptoms and lesions if affected at all.

"It has been found that the sera of birds that have recoved from the inoculation will agglutinate an antigen made by suspending washed autoclaved *S*[*almonella*] *pullorum* in the embryonic fluid of infected embryos. The agglutinins appear in the blood stream about the tenth day after inoculation. Birds with a strong agglutination reaction in dilutions of 1:20 or higher do not show the characteristic leucocytosis following inoculation. When an artificial air cell was made on the side of eggs produced by inoculated hens we were able to isolate the virus from the embryo and embryonic membranes of many of them. The virus was present in 80 percent of all eggs examined 2 mo. after the hens had been inoculated and in 20 percent 5 mo. after inoculation. We have also been able to isolate the virus from 2 to 24 eggs examined from a flock where the disease was reported to be present." The authors were able to isolate this infectious agent from birds originating from four separate poultry farms and from the eggs of a fifth farm. Serum from a bird injected with any of the strains will agglutinate an antigen made with any of the five strains. Intranasal, intratracheal, and intracutaneous injections have eliminated the possibility of bronchitis, laryngotracheitis, and fowl pox. Birds with a positive agglutination titer to this blue comb virus are susceptible to laryngotracheitis and fowl pox.

Two new compounds help control coccidiosis, P. P. LEVINE (*Poultry Tribune, 49 (1943), No. 4, pp. 35, 36–37*).—The value of sulfur and of sulfaguanidine in the ration in the control of coccidiosis in chicks is discussed.

Histomoniasis in broilers, D. F. EVELETH. (Ark. Expt. Sta.). (*Vet. Med., 38 (1943), No. 4, pp. 148–149, illus. 1*).—The author reports upon the finding of lesions in broilers kept under farm conditions which resemble those met with in blackhead-infected turkeys. Organisms similar to *Histomonas meleagridis* were demonstrated in cecal and hepatic tissue. A disease simulating histomoniasis was transmitted by pen contact of infected and normal chickens and by feeding fecal material from infected chicks to normal chicks. Sanitary measures with the elimination of cecal worms and the prevention of coccidiosis appear to prevent the spread of histomoniasis within a flock. Chickens experimentally infected with *H. meleagridis* did not make as satisfactory growth as did the controls.

Effect of ethanolamine and betaine on perosis in chicks, J. McGINNIS, L. C. NORRIS, and G. F. HEUSER. (Cornell Univ.). (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 2, pp. 293–294*).—The occurrence of perosis in chicks was markedly reduced by supplementing the basal diet with betaine hydrochloride. Ethanolamine was slightly effective in one experiment in preventing perosis but not in the other. Supplementing the diet with both ethanolamine and betaine was somewhat more effective in reducing perosis than either one alone. Under the experimental conditions betaine also promoted growth and reduced mortality.

Salmonella infections of breeding turkeys, B. S. POMEROY and R. FENSTERMACHER. (Minn. Expt. Sta.). (*Amer. Jour. Vet. Res., 4 (1943), No. 11, pp. 199–208*).—It is considered highly improbable that a single agglutination test will remove *Salmonella*-infected turkeys from a breeding flock. 'Repeated tests of infected flocks will usually reveal additional infected birds. No explanation is offered with reference to multiple type *Salmonella* found in young poults, in view of the fact that none of the adults was found similarly affected. *S. typhimurium* is capable of localizing within the intestinal tract. It may be transient in some birds and permanent in others. The serum agglutination titer of birds infected wth *S. typhimurium* may vary decidedly over a period of several months. The rapid whole-blood stained antigens used were not found to be reliable diagnostic agents for the detection of turkeys affected with paratyphoid infection. The heaviest mortality occurred during the first month of the poult's life. Approximately 10 percent of the survivors showed evidence of infection as determined by the agglutination test. The limited amount of data obtained disclosed, as was to be expected, that cross-agglutination with other *Salmonella* did occur. Three additional *Salmonella* types were isolated from poults—*S. new brunswick*, *S. illinois*, and *S. panama*."

Cross-agglutination studies between Salmonella pullorum and other microörganisms isolated from turkeys positive to the pullorum test, R. G. SANDERS, B. S. POMEROY, and R. FENSTERMACHER. (Minn. Expt. Sta,). (*Amer. Jour. Vet. Res., 4 (1943), No. 11, pp. 194–198, illus. 2*).—The cross-agglutination between micro-organisms other than *S. pullorum* consistently isolated from pullorum-positive turkeys and *S. pullorum* was shown and indicates one of the reasons why an investigator cannot consistently isolate *S. pullorum* from turkeys reacting positive to the agglutination test for pullorum disease. The cross-agglutination established gives a possible explanation for the many atypical agglutinations which are so frequently encountered in routine testing of turkeys for pullorum disease. Quantitative absorption studies were made which give further evidence of cross-agglutination between the micro-organisms studied.

Swine erysipelas in turkeys in the State of Washington, J. E. Lindenmayer. (West. Wash. Expt. Sta.). (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 794, pp. 368–370*).—Swine erysipelas in turkeys has increased in importance with the rapid growth of the industry in Washington State. In turkeys the symptomatology of the disease is indefinite. They generally become debilitated and somnolent. The onset of the disease is sudden and death usually follows in an affected bird in 24 to 48 hr. A yellowish diarrhea is present in most cases. The watery stool contains strings of mucus. The finding in Washington that the disease is most evident in the winter supports the work of Rosenwald and Dickinson in Oregon (E. S. R., 85, p. 541). The greatest incidence has been in birds from 5 to 6 mo. of age. Removing the normal birds from the land on which an outbreak occurs and taking every possible precaution to avoid water puddles are two of the measures found most satisfactory. Debeaking the toms is a good precautionary measure.

Paratyphoid infection in quail, C. H. Cunningham (*Amer. Jour. Vet. Res., 4 (1943), No. 11, pp. 190–193*).—Record is made of the isolation of *Salmonella bredeney* from quail chicks in a comercial game-bird hatchery in Maryland, it being the first known record of such isolation from this bird. The disease produced was acute, and the highest rate of mortality occurred in chicks from 3 to 9 days old. Embryos of the eggs examined had lesions similar to those observed in the chicks, but bacteriological examinations were negative. The data and agglutination tests did not indicate that the infection was of ovarian transmission. Mortality in chicks 4 weeks old and older was negligible. Hygienic practices during incubation were not satisfactory, and it is possible that the incubators were contaminated with *S. bredeney*. The wide range of humidity in the incubators and the numbers of abnormal chicks sent to the brooder house probably contributed to the production of a weak chick which may have furnished a fertile source for the invasion of *S. bredeney*, the infection occurring possibly from the time of hatching. Hygienic practices in the brooder house were satisfactory. An analysis of the data for the hatching season did not offer a reliable criterion for a definite statement that any one phase of the management of the laying flock, the incubation of the eggs, or the handling of the chicks was definitely responsible for the infection with *S. bredeney*.

AGRICULTURAL ENGINEERING

Run-off, erosion, and methods of control, W. H. Lyford, Jr. (*New Hampshire Sta. Bul. 345 (1942), pp. 31–33, illus. 1*).—Experiments and observations on seven runoff plats and two field areas on Paxton fine sandy loam were carried out to find a rotation suitable for erosion control in commercial potato growing.

Paxton fine sandy loam was shown to be nonerosible in an area in sod for about 15 yr. and top-dressed with hen manure occasionally, so that the percentage of organic matter and degree of aggregation were high when the piece was plowed in the fall of 1939. This soil was slightly erosible in a field which had been in sod for a number of years until 1938, when it was plowed and cropped to potatoes for 2 yr. In the spring of 1940 it was sown to a grass mixture. This soil was erosible in a field which had been cropped to potatoes continuously for 12 yr. Only two storms caused soil loss during the year 1941, and the greatest amount of soil loss for any one plat was 0.022 ton per acre or about 1 lb. per plat. One soil loss resulted from a thunderstorm on July 12, when 1.36 in. of rain fell. The 5-min intensity of this storm was 4.80 in. per hour and the 30-min. intensity was 2.20. Practically all the soil came from the narrow space between the last contoured row and the edge of the plat. The water did not break over the contoured rows. The second soil loss was a result of a rainfall of 0.98 in. on December 23 and 24, which melted a previous 4-in. snowfall. The surface 1 in. of soil was thawed during the storm, and the small amount of soil lost was removed from this thin layer. Runoff occurred as a direct result of seven storms during the year, and in addition occurred on 14 days as a result of thaws which melted the snow on the plats.

More production from improved irrigation practices, H. Matson. (U. S. D. A.). (*Agr. Engin., 24 (1943), No. 4, pp. 119–120, 122*).—Among conditions needing improvement, as pointed out in this discussion, are seepage losses from irrigation ditches (often amounting to from 20 to 40 percent), which may be greatly reduced at from 15 to 40 percent of the cost of 4-in. concrete linings by the use of asphalt-aggregate mixes or of earth linings stabilized with asphalt or cement and compacted; losses of about 25 percent of the applied water by seepage below root zone, a loss which can be prevented by proper lay-out of field irrigation structures and by thorough leveling, provided good application practices are followed and the land is irrigated only at need; and losses of from 15 to 20 percent by evaporation, reducible by cultivation to prevent cracking or the formation of a hard crust after irrigations.

Field tests conducted in 1938 near Ellensburg, Wash., showed that contour irrigation (of potatoes) was superior to down-the-slope irrigation in that (1) less frequent irrigations required, resulting in a labor saving; (2) waste water reduced by 15 percent; (3) erosion reduced by 90 percent; (4) production increased from 1.5 to 2 tons per acre; and (5) quality increased by average of 9 percent No. 1 potatoes. Reducing the length of run from 625 to 325 ft. (1) increased the yield from 1.5 to 1.75 tons per acre, (2) increased quality from 39 percent of No. 1 potatoes to 49 percent, (3) reduced erosion by one-third, and (4) reduced waste water by 3 percent.

A study of garden irrigation, L. H. Schoenleber. (Kans. State Col.). (*Agr. Engin., 24 (1943), No. 3, pp. 75–78, 80, illus. 11*).—Furrow, overhead spray, rotary spray, perforated pipe, and subirrigation methods were used. The normal number of drought periods occurred every year. The number of drought days was above normal, however, for all years except 1942. The surface soil was of silt loam, the subsoil of clay loam texture. Approximately 12 in. of supplemental water annually would be needed for maximum garden crop yields under normal conditions.

The average rate of application was 0.86 in. per hour using perforated pipe, 0.59 using furrow, 0.39 using overhead spray and subirrigation, and 0.36 in. per hour using the rotary spray system. The furrow-irrigated plat required an average of 33.6 man-hr. per acre to irrigate, or approximately 10 times the labor required to irrigate by other methods. In most cases more water was retained for plant use in the top foot of soil than in the second or third foot. The average efficiency for the top 3 ft. of soil was 50.5 percent of overhead spray, 47.1 of furrow, 44.3 of rotary spray, 41.5 of perforated pipe, and 29.6 percent of the subirrigated plat water applications. In nearly every plat receiving equal quantities of water, the plat having highest water application efficiency also produced the largest yields. The average water application efficiency for the plat receiving the large applications was 53.6 percent, while for that receiving small water applications it was 49 percent. Both plats were irrigated by perforated pipe. In general, all plats irrigated produced increased yields.

Early-spring vegetable crops matured and were harvested without need of irrigation water. Irrigation water was always applied after early-spring vegetables were harvested. Irrigation was usually beneficial for late-spring, summer, and fall crops. During 2 yr. when all irrigated plats received the same quantity of water, the average yields for late-spring, summer, and fall vegetable crops were 59.2 percent more for overhead-spray irrigated plat, 54.8 more for the rotary-spray irrigated plat, 45.8 more for the furrow irrigated plat, 37.2 more for the perforated-pipe irrigated plat, and 34.2 percent more on the subirrigated plat than yields on the check plat receiving no irrigation water.

Over-all performance of series combinations of machines as affected by the reliability of individual units, E. G. McKibben and P. L. Dressel. (Mich. State Col.) (*Agr. Engin., 24 (1943), No. 4, pp. 121–122, illus. 1*).—The authors point out the diminution of percentage effective operating time of machines used in series involved in the performance of a compound operation in accordance with the mathematical statement $y=100\frac{(x_1\ x_2\ x_3 - x^n)x}{100^n}$. In addition to the usual precautions against break-down from neglected wear, as far as practicable the capacities of the various units should usually be so matched as to avoid the temptation to overload or overspeed the low-capacity units. On the other hand, where certain units, such as trailers, are very much lower in cost than the other machines in the series, they may well be so selected as to have somewhat greater capacities. Under some conditions it may even be economical to have an extra trailer available. Also, for the conditions being considered, the most effective type of labor available is usually well worth the increased wages.

Effect of full load on farm machine operating economies, H. P. Bateman. (Univ. Ill.). (*Agr. Engin., 24 (1943), No. 4, pp. 111–114, illus. 4*).—A small additional quantity of fuel is practically the only additional cost involved in operating a tractor at full load, as compared with less than one-half load during a large part of the season, as at present. On most farms, combining machines is the most effective way to increase the load on the tractor. The operating and physical characteristics of some machines make it difficult to use them most effectively in combination, however; and the different operating conditions required for various machines make it difficult to operate all of them so as to develop a full tractor load the greater part of the time. The number of light load operations that can be performed more economically by a small tractor than by a larger one should be considered in selecting farm tractors. Further solutions of loading problems will result from improving the design of tractors to increase fuel economy at part loads, and from changing the design of some machines to permit their use at higher speeds or in combination with other machines to provide a greater load for the tractor.

Using the tractor efficiently, A. W. Clyde (*Pennsylvania Sta. Bul. 441 (1943), pp. 24+, illus. 15*).—In its present form this revision of Bulletin 343 (E. S. R., 78, p. 407) takes up as its main topics mechanical condition, fuels and compression, oils, traction, hitches, care of air tires, and the cost of owning a tractor.

A bulldozer for general-purpose farm tractors, V. Overholt, C. B. Richey, and L. B. Morehead. (Ohio State Univ. et al.). (*Agr. Engin., 24 (1943). No. 3, pp. 73–74, illus. 5*).—The 5-ft. width seemed to be about right for the two-plow tractor used. The bulldozer is pushed by two pieces of 2.5-in. pipe which hinge at the tractor drawbar. The cutting edge of the blade is a section of a grader bit supported by a 5-in. steel channel. Above the channel 2-in. oak planks, used for the blade, are bolted to 3-in. steel angle uprights which, in turn, are welded to the channel at the bottom and are attached to the push pipes about 8 in. above the cutting edge of the blade. Braces of 1.5-in. steel angle extend from the top of the uprights back to the push pipes. The lifting power is furnished by the tractor power take-off which operates an automobile rear axle with a cable-winding drum on one side. This rear axle serves as a clutch, a reduction gear, and a brake, being controlled by a foot lever. When the foot lever is depressed half way, the winding drum brake is released and the bulldozer drops. When the foot lever is depressed all the way, the brake on the side opposite the winding drum is tightened and the differential action causes the winding drum to turn, lifting the blade. When the foot lever is not depressed a spring pulls it up and tightens the brake on the winding drum, supporting the blade in any desired position. Uprights bolted to the front of the tractor frame support the pulleys for lifting the blade and keep it in place laterally. Hardwood strips are bolted to the outer sides of the uprights to serve as a rubbing surface for the guiding slides on the push pipes.

A subsurface row-crop cultivator, L. F. LARSEN and E. C. JOY. (S. Dak. State Col. and U. S. D. A.). (*Agr. Engin., 24 (1943), No. 4, p. 123, illus. 6*).—Two subsurface row-crop cultivators were built for use where plant residue remains on the surface, one a two-row, horse-drawn cultivator rebuilt for use as a tractor-drawn subsurface row-crop cultivator, the other a tractor-mounted machine. The construction of these machines is briefly described. Of the tractor-mounted machine, it is noted that most such cultivators have the shovel gangs mounted ahead of the rear drive wheels, with additional shovels or spring teeth mounted in the rear to loosen up the soil packed by the tractor drive wheels. When three subsurface sweeps are used, for two-row cultivator an arrangement, such as mentioned above, would require two extra sweeps to follow the tractor drive wheels. It is also a decided advantage not to have the tractor drive wheels operate on loose soil. For these reasons it was decided to mount the three sweeps on a tool bar at the rear of the tractor. The disk hillers were mounted between the front and rear wheels to serve as a guide for tractor driving.

A converted subsurface tiller, L. F. LARSEN and E. C. JOY. (S. Dak. State Col. and U. S. D. A.). (*Agr. Engin., 24 (1943), No. 3, p. 88, illus. 6*).—Revising the design of a previous tractor plow conversion attachment, also described, which showed some inconvenient behavior in field trials, the authors used the same 14-in. two-bottom plow with the beams spread 42 in. apart, center to center. A heavy angle iron was used as a tie bar and a diagonal brace added for rigidity. An extension was made on the front beam spreader and also on the cross hitch bar. The land axle and furrow axle were fastened together as one solid axle, with provision for individual depth adjustment. All changes were made on the tiller, with the wheels blocked up to simulate normal working depth. A semifloating hitch which made possible the removal of the rear furrow wheel was constructed. Two 45-in. Pence sweeps, originally made for a McCormick-Deering lister, were added. The above plan resulted in a simple and satisfactory subsurface tiller which could be easily and quickly reassembled for conventional plowing.

Labor saving by sugar beet mechanization, E. M. MERVINE. (U. S. D. A. coop. Colo. and Calif. Expt. Stas.). (*Agr. Engin., 24 (1943), No. 3, pp. 79–80, illus. 1*).—Summarizing recent progress in the mechanization of the sugar beet, the author finds that it is possible, by using small seed balls, to obtain a near approach to single-germ seed balls; to grind large seed balls to a small size and approach single-germ seed balls; to build planters that will give a practically even distribution of seed balls in the furrow, insuring a high percentage of single plants; that it is practical to use much smaller planting rates than heretofore, making is unnecessary to do so much thinning, and to thin these stands mechanically; that mechanical thinning reduces the labor more than half; that mechanical topping of beets is correctly regulated, resulting in quality superior to that obtained by average hand labor; and that mechanical harvesters leave the tops in better condition for cattle feed than does hand labor and miss fewer beets than do hand harvesters, are built at a cost that makes their operation economically sound, and make possible elimination of more than half the present labor requirements.

Mechanical thinning of sugar beets, E. M. Mervine and R. D. Barmington. (Coop. U. S. D. A.) (*Colorado Sta. Bul. 476* (*1943*), *pp. 18, illus. 17*).—The authors found that completely mechanized thinning required but 2.45 man-hr. and gave yields of 12.24 tons per acre; partial mechanical thinning, completed with the long-handled hoe, 11.6 man-hr. and 11.4 tons; thinning with the long-handled hoe alone 15.6 man-hr. and 11.47 tons; and the usual hand blocking and thinning 27.2 man-hr. and 12.17 tons per acre. Other points emphasized are that perfect germination stands are not necessary for successful mechanical thinning, and that stands of from 25 to 50 percent (at least one beet in each of from 25 to 50 in. in each 100 in.) can be mechanically thinned; that segmented seed, though highly desirable in that less doubles will result, is not absolutely necessary for mechanical thinning; that a reasonably good job of planting segmented seed can be done with the standard flute-feed type of drill, although care will be needed in working over and adjusting most of these drills to handle segmented seed, and especially designed planters have been developed as an aid to mechanical thinning; and that seeding rates may be much reduced when segmented seed is used, 7 lb. per acre being sufficient in many areas and 2 lb., sometimes without subsequent thinning, may give very desirable stands under nearly ideal germination conditions. Designs of special thinning knives for the beet cultivator are shown.

Sugar-beet blocking by machinery, S. W. McBirney (*U. S. Dept. Agr., Farmers' Bul. 1933* (*1943*), *pp. 9+, illus. 5*).—This supersedes Leaflet 97 (E. S. R., 70, p. 258). Adaptation of existing cultivating tools for beet blocking is discussed, various types of weeder knives being described and illustrated. Most of the publication is devoted to cross blockers, their set-up and adjustment. One cotton chopper adapted for row blocking is shown and briefly described, however.

Production and processing of castor beans, H. Miller (*Agr. Engin., 24* (*1943*), *No. 4, p. 124*).—The plant is a perennial, of which the earlier varieties can be raised as much as 200 miles north of the northern limit for cotton. Planting can best be done with the corn planter, cultivation with regular row-crop equipment. In threshing castor-beans it is necessary to remove the seed capsules from a woody stem, split the capsule into its three parts, and remove the husk from the seed. The first two of the above operations are done well by feeding the clusters through a standard threshing machine cylinder with speed reduced and concave teeth removed if a spike tooth type of machine. The seeds with the husks are taken from the rear of the grain pan and passed between two rubber-covered cylinders running at different speeds. The seed and loose husks are then run over the shoe and the husks separated from the seed. The stalks yield a good grade of cellulose that can be used in the better grade of paper and for making cellophane, rayon, and gunpowder. Experimental runs in paper mills have shown, however, that only those mills designed to use wood as a raw material can be readily converted over to the use of castor-beans. Castor-beans contain about 50 percent oil. Plants for expelling the oil from the seed are in existence. The residue after the oil is expelled is poisonous, but makes an excellent fertilizer, especially where ground insects are troublesome, since it serves as a fertilizer and for the destruction of some insects. There are now rubberlike materials made from oils other than castor, but castor oil would serve the purpose much better.

Machinery problems in the production of rubber-bearing plants, R. B. GRAY. (U. S. D. A.). (*Agr. Engin., 24 (1943), No. 4, pp. 125–126*).—Guayule seed, previously soaked, is planted by means of a special planter which consists essentially of a ribbed roller with seven ribs, spaced 7 in. on center, forming grooves in the soil 2 in. wide by 1 in. deep in which the seed is deposited at the approximate rate of 25 seeds per foot. In the same operation, to prevent the very light seed from blowing away, it is covered with sand conveyed to each groove by individual conveyor belts. After seeding, the beds are kept wet by frequent sprinkling from an automatic overhead irrigation system. The seven rows thus planted constitute the beds between which 8-in. boards are laid flat for a "catwalk" to facilitate subsequent mechanical operations. Cultivating is performed by driving on these boards a one-plow tractor with a 56-in. tread (center-to-center distance of the boards) and gangs of small blades mounted on the rear which cut into the soil between the rows to kill the weeds. The remaining weeds are removed by hand. The weeding is done by two men or women who sit on a four-wheel cart and push it along on the boards as they pull the weeds. At the end of 6 or 8 mo. the seeds, which are fluffy and shatter easily, are gathered from the young seedlings with a vacuum device. The seeds are jarred loose from the plants by a small beater or brush and are sucked into a collecting box by the partial vacuum created by a suction fan. The plants are then cut back to a 2-in. stubble with a mower of conventional design but with a high-speed sickle, and the whole bed is uprooted with a tractor-drawn bed lifter. One type of lifter, consisting of a U-shaped plow with the floor flat and extending the full plat width, cuts off the roots about 8 in. below the ground surface and breaks the soil so that the plants can be picked out readily by hand.

The field stage begins with the transplanting of these lifted plants to the field with a conventional transplanter which is adapted for setting six rows at a time on 28-in. centers and from 12 to 24 in. apart in the rows. These young plants have tap roots about 6 in. long and must be planted vertically for best results. This was acomplished mainly by altering the furrow opener so that it would enter the soil to an 8-in. depth. It was necessary to add some additional weight and strengthen the machine to withstand the extra load imposed. At harvest the shrub is uprooted. One type of equipment consists of a heavy windrowing plow mounted on the front of a large track-laying tractor and a pulled machine for picking up the windrow. Another is a modified beet lifter. Cutting the shrub into short lengths was found to entail considerable loss of rubber in storage. Experiments have now been made with balers, and promising results have been obtained.

The mechanical requirements for production of the rubber-bearing goldenrod (*Solidago leavenworthi*) and the Russian dandelion are similarly described.

A farm machinery repair program, C. N. TURNER. (Cornell Univ.). (*Agr. Engin., 24 (1943), No. 3, pp. 81–83, illus. 1*).—Shortages of repair and adjustment service and of spare parts were found to have become acute in some sections of New York State, in part because of machines that have been damaged and have become idle as a result of inexperienced help, and also because of the reduction in the supply of new machinery. The demands could not have been met by New York dealers even with the manpower and facilities they had before the war. One important small grain, soybean, and dairy county is without a single full-time repair shop.

In the program by which this situation was met, 15 district agricultural engineers were hired, trained in the agricultural engineering department at Cornell University, and equipped to conduct an intensive educational program in the repair, adjustment, and maintenance of farm machines. They were furnished either a pick-up or a panel truck to transport themselves and their complete set of repair tools. In addition to the usual small tools, the engineer has a welder, a portable flexible-shaft grinder, hydraulic press equipment, electric drill, and a collection of special tools for sprayers, combines, and tractors. They are provided with truck maintenance and travel funds for all necessary transportation in their counties, as well as for coming to the college for special training at 2-week intervals. They perform many repair jobs on the farm. The majority of SOS farm visit calls have been on troubles on which the farmer failed to get satisfactory help from his dealer or other service agency. These, as well as the less difficult repair and adjustment problems, have been handled satisfactorily.

A device to reclaim used baling wire, O. W. Monson and H. G. Cockrum (*Montana Sta. Cir. 170 (1943), pp. 4, illus. 4*).—The device described consists essentially of two pieces of bar steel having opposite and parallel grooves together forming a channel through which the wire is drawn, a ⅝-in. bolt and valve spring to hold the two pieces together in correct position and to permit one piece to be swung aside while the end of the wire is laid in place, and an oil cup set in a suitable hole drilled in the upper bar to feed oil into the groove. The upper bar is provided with a wooden knob for more convenient handling, and the lower bar, designed to be held in a bench vise, is provided with a stop to prevent the movable part from swinging by the closed position.

Care and use of rope on the farm, J. R. McCalmont (*U. S. Dept. Agr., Farmers' Bul. 1931 (1943), pp. 17+, illus. 14*).—Conservation measures in the use and storage of rope are suggested, a table of safe working stresses for Manila and sisal fiber ropes of from ¼ to 1½ in. diameter being given. Repair and rope work methods included whipping, the long splice, repairing a broken strand, the short splice, the eye splice, and the spliced crown; and directions for making various of the more common knots, splices, and bends are added.

Can farm structures be standardized? H. Giese. (Iowa State Col.). (*Agr. Engin., 24 (1943), No. 3, pp. 69–72, illus. 3*).—The author holds that agricultural engineers, as a society, should not carry standardization beyond that of structural parts, though individual persons and firms engaged in prefabrication may wish to standardize the building as a whole. Parts should be standardized to improve functional service; to resist applied loads; for convenience in operation; for better utilization of materials; for better design, harmony, and balance; and for better presentation in plans to a fabricator often not highly skilled in building from working drawings. Of the presentation of the designs adopted, it is noted that farm building plans have been little more than suggestions for the arrangement of space, leaving structural problems to the builder. A plan should be sufficiently complete so that the ideas of the designer are fully covered. This must be accomplished without undue complication and confusion to those not highly skilled in reading plans. Standards for presentation should cover (1) drawings to be presented, (2) symbols, (3) arrangement, and (4) sheet size. Recommendations offered by the Advisory Council on Research in Farm Structures appointed by the Secretary of Agriculture in 1929, but not thus far acted upon, are quoted and briefly discussed.

A wartime dairy barn, G. L. Edick (*U. S. Dept. Agr. Leaflet 232* (*1943*), *pp. 8, illus. 9*).—The discussion is mainly concerned with the construction of a mechanically sound and workable building with the use of minimal quantities of metallic materials and is based upon a 34- by 62-ft. plan with added feed room connecting to the base of a silo. In a building of this size, 9,000 lb. of metals can be saved, sleeves, anchors, and other fittings as necessary for substituting metal for wooden fittings after the war being included in the material used.

Causes of barn failures due to wind, C. K. Otis. (Minn. Expt. Sta.). (*Agr. Engin.*, *24* (*1943*), *No. 4, pp. 115–118, illus. 16*).—From a detailed study of damage done by one of the heaviest windstorms of the line squall type known to have occurred in Minnesota, the author determined that one or more of 10 specified weaknesses of construction was to be found in most of the barns injured or destroyed, and states 13 points of design and construction in which improvement should be made in order to provide adequate wind resistance.

(1) Foundations should be placed in the ground deep enough to resist overturning and so that subsequent erosion will not undermine the footings. (2) Sidewalls should be well anchored to the foundation. The anchors should be fastened to the studs as well as to the sill, since the usual toe-nailed joints to a well-anchored sill are weak and get weaker with age. (3) Posts should be anchored to the piers, the girders to the posts, and some of the joists to the girders. (4) Studs should extend above the mow floor and should be continuous from sill to plate to resist overturning of the sidewalls. (5) The ribbon should not be notched into the studs. (6) Diagonal braces or partitions across the stable should be utilized to the fullest extent. (7) A strong diagonal brace from the top of the studs to the floor joists should be used at intervals of 8 ft. along the sidewall above the mow floor. (8) A tie between the studs and rafters across the plate should be provided, or (better) the stud and rafter should be overlapped. (9) A good joint between the upper and lower rafters to prevent their pulling apart should be made, as by overlapping the ends of the rafters. A good brace should be provided to give this joint rigidity. (10) If a ridge board is desired, a collar beam should be used at the ridge to tie the upper rafters together. As a further precaution, a sheet iron strap could be placed over the top under the roof boards and nailed to each pair of rafters. If no ridge board is used, a triangular piece of 1-in. board can be nailed and glued to the face of each pair of rafters to furnish a good tie at this point. (11) Diagonal braces on the ends of the barn above the mow floor should be well anchored to the girders. (12) Diagonal corner braces in the sidewalls are also essential for wind-resistant construction. (13) Adequate stable ventilation is necessary to protect good construction from premature decay. A dimensioned cross section drawing of the framing of a gambrel roof barn illustrates some of these points.

Poultry houses and equipment, J. E. Dougherty and H. L. Belton, revised by H. L. Belton and V. S. Asmundson (*California Sta. Bul. 476, rev.* (*1943*), *pp. 77, illus. 79*).—This is a revision and condensation of the edition issued in 1929 (E. S. R., 62, p. 384).

Home-made electric brooders, F. E. Price, D. E. Kirk, and H. E. Cosby (*Oregon Sta. Cir. 146* (*1943*), *pp. 11, illus. 7*).—The authors describe (1) a brooder for 50 chicks or less, four ordinary light bulbs being used as the heating element, without thermostat; and (2) a brooder for 200 chicks with a heating element consisting of 163 ft. of iron stovepipe wire, No. 20 Washburn and Moen gage (0.0348 in. diameter, i. e., between No. 19 and No. 20 Brown and Sharpe

American Standard gage), this wire being tacked directly against the under surface of the top of the brooder. This constitutes a 900-w. unit at 120 v. and operates at a temperature so low as to involve no fire risk. With this type of heating unit a wafer-type thermostat with snap-action switch is used. A third type of equipment, a home-made hover for a fan-type electric brooder, 300-chick capacity, is very briefly discussed. Working drawings of all three devices are included.

New electric lamp brooder, D. C. Kennard and V. D. Chamberlin (*New Jersey Stas. Hints to Poultrymen, 30 (1942–43), No. 2, pp.* [*3*], *illus. 1*).—This is a reprint, slightly revised, of Ohio Station Special Circular 63 (E. S. R., 86, p. 843).

Community fruit and vegetable dehydrators, J. A. Schaller (*Agr. Engin., 24 (1943), No. 3, pp. 86–87, 88, illus. 4*).—The community dehydrator here described consists of (1) a top section, or fresh and return air duct, containing the heating unit, fan, and air intake damper; and (2) a bottom section, or drying tunnel, containing 4 drying trucks loaded with 18 3- by 4-ft. wood trays and provided with an exhaust air damper.

The approximate cost (less labor, without steam boiler) is $502.70, cost per ton capacity $405.00, and cost per square foot of tray surface 70 ct. An attempt is being made to reduce further this cost and the quantity of critical materials used by substituting plywood for metal in the construction of baffles and fan housing. Detailed studies of operating characteristics and performance were made at a Clarksville, Ga., plant.

Essentials of a farm type frozen food cabinet, E. C. Meyer. (U. S. D. A.). (*Agr. Engin., 24 (1943), No. 3, pp. 84–85, illus. 1*).—The author discusses briefly the answers to questionnaires sent to about 20 research institutions and concerned with rates of freezing, storage temperatures and allowable fluctuations, etc., and states some requirements adjudged essential by the Technical Standards Committee of the Rural Electrification Administration. He concludes, in part, that the projected cabinet should be of about 20 cu. ft. volume, freezing compartment capacity about 5 cu. ft., of economical, simple, and durable construction, and of such cost as to be sold through the R. E. A. group purchase system for less than $300. It should be of the top-opening type. The inside should be readily accessible both for loading and unloading and to permit cleaning, the lids to uncover not less than 75 percent of the top area. Material and construction of interior surfaces, shelving, etc., are left to the manufacturer, with the requirement that they be sanitary, easily cleaned, and noncorrosive. If a cylinder-type compressor be used, it must have at least two cylinders, be readily accessible, and be driven by a ½-hp., 60-c., 120-v., single-phase, capacitor-start, induction-run motor equipped with a built-in overload protective device. The fluctuation is limited to 1° plus or minus the set temperature of —1° F. The capacity is expressed in terms of water, requiring the freezing of 45 lb. placed in 47 paper cup containers in a period of 14 hr. in a circumambient temperature of 80°, with an initial water temperature of 80°. The energy consumption limit is to be 4 kw.-hr. per 24 hr. while maintaining —1°, +1°, in an 80° ambient. The customary 1-yr. guarantee for the entire unit is required, plus an additional 2 yr. for the cabinet.

AGRICULTURAL ECONOMICS

[Papers on agricultural economics] (*Jour. Farm Econ., 25 (1943), No. 1, pp. 366+, illus. 13*).—Included are the following papers and discussions thereon, prepared for presentation at the 1942 annual meeting of the American Farm

Economic Association: Agricultural Price Policy, January 1943, by J. D. Black (pp. 1–18); Food Price Control—Policy and Mechanics, by S. A. Segal and A. C. Hoffman (pp. 19–35); Agriculture in an Expansionist Economy, by C. H. Hammar (pp. 36–51) (Mo. Expt. Sta.); Industrial Wage Policies and Farm Price Parity, by L. G. Reynolds (pp. 52–64); Resources Available for Agricultural Production in 1943, by S. E Johnson, R. C. Tetro, and N. W. Johnson (pp. 65–83) (U. S. D. A. et al.); Techniques for Achieving Agricultural Goals for 1943, by J. J. Reed (pp. 84–94) (U. S. D. A.); Maintaining Farm Output With a Scarcity of Production Factors, by S. W. Warren and L. S. Hardin (pp. 95–100) (Cornell Univ.); Contributions of Farm Security Administration Borrowers to Agricultural Production Goals—The Corn-Belt States, by P. G. Beck and J. C. Jensen (pp. 101–104) (U. S. D. A.); The Influence of Managerial Ability and Size of Farm on the Efficiency of Agricultural Production, by C. O. May (pp. 105–109) (Mich. State Col.); Contribution of Farm Management Research to Attainment of Production Goals, by G. W. Forster (pp. 110–119) (N. C. State Col.); The Impact of War on Marketing Farm Products, by F. L. Thomsen (pp. 120–146) (U. S. D. A.); Wartime Problems of Conservation of Transportation, by D. O. Hammerberg (pp. 147–165); A Desirable Wartime Land Policy, by J. B. Bennett (pp. 166–175); War Developments in Land Utilization and Policy in the Northern Plains, by G. H. Craig (pp. 176–189) (Mont. State Col.); Land Market Developments and the War, by M. M. Regan and F. A. Clarenbach (pp. 190–202) (U. S. D. A.); Land Market Regulations, by W. G. Murray (pp. 203–218) (Iowa Sta.); Land Tenure in Mexico, by R. Fernandez (pp. 219–234); Farm Tenure Under the Strain of War, by R. Schickele (pp. 235–244) (Iowa State Col.); Organization and Objectives of the Regional Land Tenure Research Project, by H. Hoffsommer (pp. 245–257); Work and Plans of the North Central Regional Land Tenure Committee, by H. C. M. Case (pp. 258–268) (Univ. Ill.); Farm Labor Adjustments After World War I, by H. Schwartz (pp. 269–277); Farm Labor Situation and Its Effect on Agricultural Production in the Corn Belt, by P. E. Johnston (pp. 278–286) (Univ. Ill.); Farm Labour Situation in Canada, by J. Coke (pp. 287–294); Farm Labor Situation in Iowa, by D. R. Kaldor (pp. 295–297) (Iowa Sta.); Ohio Farm Labor Situation, by F. L. Morison (Ohio State Univ.) (pp. 298–300); Farm Labor and Food Production, by W. M. Curtiss (pp. 301–304) (Cornell Univ.); How Farmers Are Meeting the Scarcity of Labor, by E. J. Nesius (pp. 305–308) (Univ. Ky.); Agriculture When the War Ends, by F. F. Elliott (pp. 309–325) (U. S. D. A.); Canadian Agricultural Post-War Planning, by J. E. Lattimer (pp. 326–337); and Prices Paid by Farmers—Their Use in Administering Wartime Price Control Programs, by G. D. Harrell (pp. 338–350) (U. S. D. A.).

[Papers on agricultural economics] [*Jour. Farm Econ., 25 (1943), No. 2, pp. 367–396, 410–418, 433–476*).—Included are the following papers: Farmers and Organized Labor, by K. H. Parsons (pp. 367–383) (Univ. Wis.); Britain's Wartime Food Policy, by J. J. MacGregor (pp. 384–396); Adaptation of Crop Insurance to Tobacco, by S. E. Wrather (pp. 410–418), and Irrigation Development and Area Adjustment in the Great Plains, by J. L. Paschal and P. L. Slagsvold (pp. 433–443) (both U. S. D. A.); Food Administration Experience With Hogs, 1917–19, by W. T. Borg (pp. 444–457); and Collective Bargaining in German Agriculture Under the Weimar Republic, 1918–1933, by A. Eckstein (pp. 458–476) (Univ. Calif.).

[Investigations in agricultural economics at the North Dakota Station]. (Coop. U. S. D. A.). (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 4, pp. 14–16, 28–31, illus. 1*).—An article, Rental Rates for Farm Machinery, by W. J. Promersberger and M. H. Taylor, includes a rental schedule prepared by a special committee of the American Society of Agricultural Engineers showing rental rates per hour per $100 of new costs for different farm machines. A formula is given for determining the number of acres a machine will cover per hour.

Another article, by M. H. Taylor, Land Values and Transfers in North Dakota, discusses recent land transfers, current price trends and land values, and the land market activity, with tables showing for Traill, Ward, Morton, and Stutsman Counties the number and value of voluntary; tax deed, foreclosure, and assignment; and court decree and estate settlement transfers during the third and fourth quarters of 1941 and 1942 and the proportion of all farms transferred and the proportion transferred voluntarily October 1, 1940 to December 31, 1942.

Current Farm Economics, [April 1943] (*Oklahoma Sta., Cur. Farm Econ., 16 (1943), No. 2, pp. 41–72, illus. 1*).—Included are the usual review of the agricultural situation, the usual tables of prices and price indexes, and articles entitled: Number and Value of Livestock on Farms, by D. L. W. Anker (pp. 50–52); Farm Yields of Feed From Major Oklahoma Crops, by P. Nelson and E. A. Tucker (pp. 53–60); and Short Staple vs. Long Staple Cotton in Western Oklahoma, by J. D. Campbell (pp. 61–66).

New light on factor analysis, S. A. Engene. (Minn. Expt. Sta.). (*Jour. Farm Econ., 25 (1943), No. 2, pp. 477–486, illus. 1*).—The hypothesis that a greater increase in farm income results from correcting the weakest factors than from improving those that are already good is tested statistically with data from 1,545 records covering the years 1928–38, inclusive, obtained from the Southeast Minnesota Farm Management Service. "This analysis indicates that a farmer's earnings may be increased slightly more by improving the factors in which he is lowest than by improving the factors in which he is highest. The data indicate this to be a probability, not a certainty. But the difference is so small as to have no practical importance. The simple rule that a farmer should improve first the factor in which he is lowest cannot be used safely as a guide in management. A thorough analysis of the nature of all factors and the opportunities for improvement on the individual farm is needed in each case before a positive recommendation can be made to the operator."

Atlas of agricultural information: Appalachian Region, W. Anderson et al. (*U. S. Dept. Agr., Interbur. Com. on Post-War Planning, 1942, pp. [106], illus. 59*).—This loose-leaf atlas includes maps, charts, and tables presenting basic facts about agriculture and related activities affecting the rural economy of Kentucky, North Carolina, Tennessee, Virginia, and West Virginia. The materials which are related to 9 physiographic provinces and 45 subdivisions—resource areas—are presented under the following headings: Physical resources, farms and farm production, industry, marketing and transportation, income, population and employment, social factors, and field activities of Federal agencies.

Parity and progress, D. Paarlberg. (Cornell Univ.). (*Jour. Farm Econ., 25 (1943), No. 2, pp. 419–432, illus. 3*).—Comparisons for the years 1913–39, inclusive, are made of farm labor earnings in the Northeastern States and wage income of industrial workers in the United States, prices received by farmers in the United States and purchasing power of farm prices in the United States, and of parity prices and the purchasing power of price of farm products and farm labor earnings. "Parity of prices to the farmers of the Northeast would probably provide a net return considerably greater than pre-war in dollars and slightly greater than pre-war in command over goods. The maintenance of parity prices would give the farmer no acceptable answer to the disparity between incomes of agricultural and industrial groups."

Utilization of irrigable land in the Reservation Area of Uinta Basin, Utah, G. T. Blanch and C. E. Stewart. (Coop. U. S. D. A.). (*Utah Sta. Bul. 303 (1943), pp. 53+, illus. 5*).—This study is based largely on data available from detailed soils, irrigation water range, and economic studies of the Uinta Basin. Two classifications of the lands of the Reservation Area are made, one based on present use of lands and irrigation water and one indicating what might be a desirable use over a relatively long period. The area is divided into 130 subareas, relatively uniform as to soil, irrigation water supply, and location with respect to community organizations and costs of irrigation waters. In the study of the present use of lands and water, the subareas were classified into the following classes: "(A) Relatively satisfactory soil and water conditions; (B) adjustments in soil and water use desirable; (C) adjustments in soil and water use imperative; and (D) land largely not irrigated but good enough to irrigate." In the desirable-use classification, all the lands were included in class II, V, and VI of the six classes applicable to all Utah land. Under the present-use classification, the agricultural resources under each of four classes, the present use of lands and water resources, and the social and economic results of the present use and control are discussed. Under the desirable-use classification, the land classes in the area, suggested organization of farms, and the probable results of indicated adjustments are discussed.

Of the 200,892 acres classified, only 33,767 acres were in class A, 54,483 in class B, 62,436 in Class C, and 50,206 acres in class D. The farms were the largest, yields the highest, labor income highest, farm buildings best, farm labor most fully utilized, and in general the social and economic conditions most desirable in class A and least desirable in class C. Of the 116,000 acres classified as irrigated in 1936, 77,000 acres were suitable and 39,000 not suitable for cultivated crops according to the land survey reports. The average amount of irrigation water—normal flow of streams plus present storage capacity—is sufficient for first-class water rights for about 77,000 acres. In addition, in normal years there would be additional water to irrigate about 47,000 acres of pasture during May, which acreage would decrease to about 15,000 in September. In the desirable-use classification, all lands are distributed as follows: Class II (grazing and pasture) 102,647 acres, class V (extensive irrigated farming) 86,643 acres, and class VI (more extensive irrigated farming) 11,602 acres. A sample of 192 of the 1,600 farms in the Reservation Area showed net farm income of only $134 in 1935.

Public works and rural land use, W. I. Myers et al. (*Washington: Natl. Resources Planning Bd., 1942, pp. 167+, illus. 1*).—"This report presents a revised statement of the objectives and criteria for public undertakings to conserve and improve our rural land resources. It supplements and brings up to date the materials on this subject in the report of the National Resources Board for 1934." It consists of statements on public works in relation to the use of land for agriculture, grazing, forestry, wildlife, and recreation, prepared by committees of technicians in the Department of Agriculture and the Department of the Interior, under the direction of the Evaluation Subcommittee of the Land Committee of the National Resources Planning Board.

Areal and functional consolidation of Tennessee counties, C. E. Allred and B. H. Luebke (*Tennessee Sta., Agr. Econ. and Rural Sociol. Dept. Monog. 151 (1943), pp. 39+, illus. 23*).—The number and size of Tennessee counties and the cost of county government are briefly described. The desirable size of a county, the per capita expenditure for different functions by size of county, and suggested plans for territorial and functional consolidations are discussed.

County road use and finance in Maryland, W. P. Walker (*Maryland Sta. Bul. A19 (1942), pp. 213–249+, illus. 1*).—"This report shows the extent and characteristics of travel by farm and nonfarm motor vehicles, especially on county roads. Highway-user taxes and other taxable resources available for county road support are analyzed. Programs for the financial support of local rural roads are appraised from the standpoint of tax burdens and resources."

Extent of changes and equalization produced in farm property assessments by reassessing in Maryland, W. P. Walker and E. E. Miller (*Maryland Sta. Bul. A9 (1942), pp. 221–248+, illus. 1*).—The purpose of this third report of the series (E. S. R., 87, p. 585) is to show the changes in individual property assessment, the degree to which inequalities have been reduced, and the completeness of assessment coverage, especially on livestock, brought about by reassessment processes.

Real estate assessments against 1,787 farms just prior to and after the 1937–39 reassessment are compared. Farm transfers of 938 farms, just prior to reassessment, were studied to determine whether the assessments were improved. Assessments on livestock in 16 election districts of 6 counties were also studied. The changes in farm real estate assessment, the equalization of such assessments based on sales prices and census values, the factors reponsible for the unequal assessments, and the improvement of livestock assessments are discussed. The weakness of the methods and procedures are briefly discussed, and suggestions are made for methods of improvement.

Neither land nor building assessments were changed on 14 percent of the farms. Land assessments were not changed on 41 percent. The average net change per farm was 1 percent, consisting of a decrease of $75 on land and an increase of $129 on buildings. The greatest equalization was effected on farms substantially overassessed and on low value per acre farms. Uniform rates applied to land classes were partly responsible for the unequal assessment. Reassessment of livestock in the 16 election districts resulted in an increase of 13 percent in the number of livestock accounts and about 30 percent in the number of livestock, due in part to normal increases in the number of dairy cows. In one county where the personal property was listed annually, about 60 percent of the accounts showed an increase of from $85 to $146 per farm and 40 percent decreases of from $75 to $109. In other counties, where personal property assessments were not changed for several years, about 53 percent of the accounts were increased an average of $373 per farm, 42 per cent were decreased an average of $262, and 5 percent showed no change.

Short-term credit on the lower Eastern Shore of Maryland, P. R. Poffenberger, S. H. DeVault, and W. J. Lodman. (Coop. U. S. D. A.). (*Maryland Sta. Bul. A8 (1942), pp. 189–220+, illus. 8*).—In this study, made in 1939, detailed information was obtained by interviews on 210 farms and fewer pertinent facts from 939 other farms. Thirty agencies making cash loans were also studied. Analysis is made of the credit used; amount of real estate mortgages; short-term cash loans (use, source, security required, and delinquencies); merchant credit for feed, fertilizers, livestock, and other purposes; and credit used by size and type of farm and by tenure groups. The policies and practices of merchant lenders and cash loan agencies are discussed. Recommendations are made regarding the use of credit by farmers.

Of the 916 farmers contacted, 438 reported no use of credit. The analyses of 207 records showed the number of farms and the amount of credit to be: Real estate mortgages, 92 and $2 291; cash loans, 76 and $391; merchant credit, 120 and $850; installment credit, 17 and $523; open accounts, 44 and $137; total short-term credit, 257 and $572; and all credit, 350 and $1,029. Cash loans accounted for about 20 percent of the total short-term credit, merchant credit 70, installment credit 6, and open accounts 4 percent. Of merchant credit, 59.4 percent was for feed, 22.9 percent for fertilizers, and 14.2 percent for livestock. On farms of different sizes (tillable acres) credit amounted to the following percentages of the total farm expenses; 0–24 acres, 67; 25–49, 29; 50–74, 35; 75–99, 33; and for 100 acres and over, 21. For different types of farms the percentages were truck 23, poultry 63, grain 25, livestock 6, dairy 24, general 23, and all farms 35. Short-term credit used on mortgaged farms averaged $520, on nonmortgaged $420, and on tenant-operated farms $380, being 23, 29, and 29 percent, respectively, of the total cash expenditures. The broiler industry accounted for over 60 percent of the total merchant credit. Interest charges averaged 5.6 percent on cash loans and 18.6 percent on all merchant credit accounts.

Cotton loan program in Tipton County, Tennessee, 1941 and 1942, M. B. JOHNSON (*Tennessee Sta., Agr. Econ. and Rural Sociol. Dept. Monog, 149, (1943), pp. 42+, illus. 13*).—Findings are reported in a preliminary study to determine the channels open to place cotton in a loan, the amount placed in loans, the extent to which farmers use the Government cotton loan program, and why more use was not made of this program.

Approximately 7.4 percent of the 1941 crop and 9.3 percent of the 1942 crop were placed under loan. In 1941, 5.3 percent of the loans were with the Commodity Credit Corporation, 0.6 percent with the Mid-South Cotton Growers' Association, and 1.5 percent with banks. In 1942, the respective percentages were 1.8, 5.6, and 1.9. Fifty-five sample farms sold 60.7 percent of the 1941 crop to cotton buyers and 39.3 to ginners. In 1942, 69.5 percent sold to buyers and 30.5 percent to ginners.

Investments by farmers—wise and otherwise, L. H. BROWN (*Michigan Sta. Spec. Bul. 322 (1943), pp. 31, illus. 6*).—The data on which this study is based were obtained by questionnaires from 423 farmers cooperating with the College in keeping farm accounts and 57 Farm Security Administration borrowers. Replies to questionnaires sent to 80 banks were also used. The total investment; the investment during 1941; plans for future investments in land, improvements, machinery, livestock, and other phases of the farm business; debt payment; and investments outside the farm business are analyzed and discussed.

Farm machinery in critical state: Care of existing machines and sharing of equipment imperative, W. M. CURTISS. ([N. Y.] Cornell Expt. Sta.). (*Farm Res. [New York State and Cornell Stas.], 9 (1943), No. 2, pp. 1, 15*).—Results are tabulated and discussed of a farm-to-farm survey, made in the summer of 1942 on 850 farms in 13 counties of New York, as to farm machine stocks, 1941 and 1942 purchases, and needed 1943 replacements.

Labor requirements for crops and livestock, M. R. COOPER, W. C. HOLLEY, H. W. HAWTHORNE, and R. S. WASHBURN (*U. S. Dept. Agr., Bur. Agr. Econ., 1943, F. M. 40, pp. 140+*).—"This report contains information on the average number of man hours used in an average season to produce an acre of each of some 90 crops; number of hours used in caring for various classes of livestock for a year; number of hours used in producing livestock products, such as hundredweight of pork, beef, milk, and a hundred dozen of eggs; and data related to the labor requirements, such as average yields of crops, number of livestock on farms, production of livestock, and certain factors for converting livestock labor requirements from a live weight to a dressed weight basis, and for computing the number of man hours needed to harvest crops of various yields."

Labor requirements for selected crops in Maryland, A. B. HAMILTON, G. S. ABSHIER, and S. H. DEVAULT (*Maryland Sta. Bul. A15 (1942), pp. 45–94+, illus. 15*).—Data were obtained from 249 representative farms selected at random in various regions of the State. Analyses are made of the total amounts of man, horse, and tractor work required for the production of the leading crops of the State, the labor requirements for different operations, and the monthly distribution of labor required. The factors affecting the variations in labor requirements of the several crops and the practices and methods used in producing the different crops are discussed.

Wartime mobilization of farm labor in South Dakota, W. L. Slocum (*South Dakota Sta., Rural Sociol. Pam. 98 (1942), pp. 5, illus. 2*).—It was found that the typical farm is a family farm; that Selective Service and defense migration will directly affect less than one farm out of three; the farm labor problem is being met by exchange of work among neighbors; village and city people may be used to some extent; and power machinery may be concentrated on particular farms. The amount of labor needed varies with the types of farming.

Cost and efficiency in producing hairy vetch and Austrian Winter field peas in western Oregon, G. W. Kuhlman and D. C. Mumford (*Oregon Sta. Bul. 415 (1942), pp. 59, illus. 5*).—"This bulletin presents results obtained in 1940 in a cost-of-production study conducted in the Willamette Valley and is based upon the production of 2,018,483 lb. of hairy vetch, 4,063,819 lb. of Austrian Winter field peas, and 707,303 lb. of common and Willamette vetch. Costs of production under various conditions are presented in terms both of money and of physical requirements (seed, labor, yield, etc.), thus enabling the grower to estimate his own costs by simply applying the current rates or price-level index to his operations. Discussion of the effects of various factors on costs and returns is also included."

The average gross cost per acre for labor, other costs, and the net costs per 100 lb. (wheat per bushel) were, respectively: Austrian Winter peas $4.34, $18.44, and $2.37; hairy vetch $3.77, $14.15, and $4 31; common vetch $3.65, $14.26, and $2.11; and winter wheat $2.72, $12.12, and 64 ct. (per bushel).

Peanuts as a wartime crop in Louisiana, F. D. Barlow, Jr., and G. Townsend. (Coop. U. S. D. A.). (*Louisiana Sta. Bul. 361 (1943), pp. 21, illus. 1*).—This report, based on data obtained in the northern Louisiana upland cotton area, appraises the experience of growers of peanuts in 1942 and analyzes the possibilities of growing the crop profitably in 1943. Comparisons are made of the expected returns from peanuts, cotton, and corn with different yields and prices. A final section discusses the cultural practices essential for the profitable production of peanuts.

"At prices which prevailed in 1942, peanuts at $84 a ton were less profitable than cotton and most other crops that were produced on farms in the hill sections of the State. However, most farmers who made 400 lb. or better of peanuts per acre added to their farm earnings provided it was not necessary for them to reduce the acreage of more profitable crops. . . . With a price of at least $120 a ton, peanuts yielding 600 lb. are more profitable than cotton yielding 200 lb. and bringing 18 to 19 ct. a pound. The per-acre returns from peanuts would be somewhat less than from cotton, but 6 acres of peanuts can be grown with the same amount of labor that is required for 4 acres of cotton."

Cost of drying cut fruit, 1942 (a preliminary report), A. Joss (*California Sta., 1943, pp. 10+*).—This preliminary report consists of summary tables relating to the cost of drying apricots, peaches, pears, and apples. It is based on analyses of records obtained from 95 operators.

The broiler industry in Maryland, T. J. Davies, P. R. Poffenberger, and S. H. DeVault (*Maryland Sta. Bul. A16 (1942), pp. 95–143+, illus. 10*).—This study, which was based on interviews in 1941 with 330 broiler producers, 22 hatcherymen, and 8 dressing plant operators, brings the information previously noted (E. S. R., 78, p. 712) up to date. It describes the location of farms, hatcheries, and dressing plants; the importance of broiler production in the

United States; and the broiler industry on the Eastern Shore area of Maryland and its relationship to the hatchery industry. The production and marketing of broilers—cost of production; sources, prices, and breeds of chicks; housing practices; mortality; sexing; marketing channels; age and weight of birds; finishing; seasonality of marketings and price; marketing problems; etc.—are discussed. The use of credit in production, partnership and contract production, and egg production on broiler farms are also discussed.

In 1941, the Del-Mar-Va Peninsula produced 59 million broilers. The Maryland production was approximately 14 million, an increase of 44 percent over 1940. Nearly ten times as many chicks were hatched on the Eastern Shore of Maryland in 1941 as in 1936–37. Ninety percent of all chicks in 1941 were hatched in hatcheries producing over a million chicks per year. Over 75 percent of the eggs hatched were purchased from the New England States. Over 25 percent of the chicks were purchased outside of Maryland. Cross-breeds composed 93.8 percent of all broiler chicks purchased. Maryland broilers in 1940 averaged 13.42 weeks old and 3 lb. in weight when marketed. The average production costs per pound were 17.2 ct. The average variation from the average monthly sales in 1940 was 1.4 percent as compared with 6 1 percent in 1935.

Cost and advisability of raising dairy heifers, A. M. Ahalt and A. B. Hamilton (*Maryland Sta. Bul. A17 (1942), pp. 145–180+, illus. 9*).—This study was designed to secure facts on the status of dairy herd replacements in the State, methods of obtaining needed replacements and the number needed annually, cost of raising heifers to maturity, and the advisability of raising heifers v. purchasing the needed replacements. Records were obtained by interviews on 200 farms in the four leading dairy counties of the State, detailed costs of raising heifers being obtained on 177 farms. The replacement problem, the sources of replacements, and the reasons given by farmers for raising and for purchasing replacements are discussed. The cost of raising heifers and the factors affecting such costs are analyzed and discussed. The organization and management of the farms surveyed—ownership, size, sources of farm income, dairy and other enterprises, feed supply, labor supply, and herd management and practices—are discussed.

For 1939, the annual replacement ratio was 1 to every 5.5 cows in the herd. About two-thirds of the cows included in the study were home-grown. The average cost of producing heifers was $87.75. The farmers estimated the average value of the heifers at freshening time to be $73 50. Home-grown feeds constituted two-thirds of the total costs and purchased feeds 11 percent. Roughage, including pasture, constituted 43 percent, concentrates 26.5 percent, milk 8 percent, and labor 15 percent. The most important single factor causing variations in the cost of raising heifers was age at freshening, which ranged from 18 to 36 mo.

Diminishing returns in feeding commercial dairy herds, L. F. Herrmann. (U. S. D. A.). (*Jour. Farm Econ., 25 (1943), No. 2, pp. 397–409, illus. 2*).—This study of the relation between feed input and milk yield is based on experiments at the West Virginia Experiment Station. "The results of this study indicate that milk yields increase at a decreasing rate with increasing total digestible nutrient inputs, reaching a maximum yield of 114 percent at a TDN input of 138 percent when 100 percent represents the yield and input attainable with the Morrison standard rate of feeding. The U. S. D. A. results [E. S. R., 88, p. 116] did not indicate that the maximum yield was obtained within the range of nutrient inputs used."

Practices and operating costs of Puerto Rican fishermen, S. Díaz Pacheco, M. Vélez, and P. B. Vázquez Calcerrada (*Puerto Rico Univ. Sta. Mimeog.*

Rpt. 21 (1943), pp. 30+, illus. 1).—This report, prepared in cooperation with the Department of Agriculture and Commerce of Puerto Rico and the U. S. Fish and Wildlife Service, Department of the Interior, gives general information as to fishermen; discusses the catch of fishery products, methods of production, problems of the fishermen, and marketing cooperatives; and makes recommendations for the improvement of the industry.

Movement, transportation, and prices of grain in Knoxville trade area, M. B. Johnson and B. J. Luebke (*Tennessee Sta., Agr. Econ. and Rural Sociol. Dept. Monog. 153 (1943), pp. 50+, illus. 31).*—The movement, transportation, and prices of wheat, corn, and other grains in the 23 eastern counties of the State and the shipments from other States into the area are discussed. Comparisons are made of grain prices in the area with the State average and Chicago prices.

Disposition and outlets for grain in Knoxville trade area, M. B. Johnson and B. H. Luebke (*Tennessee Sta., Agr. Econ. and Rural Sociol. Dept. Monog. 152 (1943), pp. 37+, illus. 11).*—This study was made to ascertain what might be done to develop or improve outlets for grain in the area. Information is included on the disposition, consumption, and outlets for grain and grain products grown in the area. Suggestions are made how dealers might develop better markets for such products.

Facilities and agencies at Knoxville livestock market, W. S. Rowan and B. H. Luebke (*Tennessee Sta., Agr. Econ. and Rural Sociol. Dept. Monog. 148 (1943), pp. 25+, illus. 9).*—The development of the market, its location, and the facilities of the Tennessee Valley stockyards, the Union stockyards, and slaughter and packing establishments are described. The methods of sale by private treaty and by auction are discussed.

Whole milk enterprise on upland farms near Douglas Reservoir area, L. J. Fenske (*Tennessee Sta., Agr. Econ. and Rural Sociol. Dept. Monog. 150 (1943), pp 45+, illus. 13).*—Data were furnished by 25 farmers in a dairy-enterprise survey made in 1942. The farm organization and dairy enterprise are described and analyses made of capital invested, costs and returns, feed and labor requirements, the factors influencing production, etc.

Efficiency of milk marketing in Connecticut.—IV, Retail distribution of milk by producers, D. O. Hammerberg, I. F. Fellows, and R. H. Farr (*[Connecticut] Storrs Sta. Bul. 243 (1942), pp. 58, illus. 15).*—This is the fourth of a series (E. S. R., 87, p. 872).

Some Connecticut farmers have added the retail distribution of milk to the production enterprises. Thus, the farm business is increased, and resources which were only partially employed can be more completely utilized. Family labor is often well adapted to producer-dealer operations. The farmer will usually be able to sell most of his milk to retail customers for fluid consumption, while the available wholesale outlets would often price more of it in lower classes. In a similar manner, other farm products may be sold on the milk route for prices substantially above the wholesale market. With daily volumes of 25 qt., costs appeared to be about 8 ct. per quart. With 125 qt. per day, costs were reduced to approximately 4 ct. per quart. Beyond that volume, costs continued to decline but at a slow rate, reaching 3.5 ct. with daily volumes of 375 qt. In many actual cases, of course, small operators were able to avoid or shift part of the costs, especially when using family labor and unspecialized equipment, and so offset some of the disadvantages of small-scale operation. Net returns from milk retailing are influenced by volume, costs, and prices or price margins. With an average spread of 6 ct. per quart between the available wholesale and retail prices, however, net returns increased from a loss with volumes of less than about 40 qt. to a gain of more than $3,000 with volumes in excess of 350 qt. It should not be inferred that success awaits all who attempt retailing. Consumer demands and desires must receive constant attention if the business is to be expanded or even maintained. The operator must have some merchandising or salesmanship ability.

Tables showing the seasonal variations in the sales and purchases of milk and cream by 186 producer-dealers in five Connecticut markets in 1937 and a description of a method of computing truck depreciation are appended.

The Colebrook plan for milk transportation, H. C. Woodworth and J. C. Holmes (*New Hampshire Sta. Cir. 65 (1943), pp. 19, illus. 5*).—The formation of the local transportation committee, the procedure used by the committee, and the problems considered in the organization of the plan are described. The procedures suggested for bringing about similar reorganization of milk transportation are outlined. The proposed relocation of milk routes in the Colebrook milkshed recommended under the plan and approved by the U. S. Office of Defense Transportation is presented. Under the proposed reorganization the truck mileage was to be reduced over 42 percent, and a considerable number of trucks would be eliminated.

Milk transportation in the Stillwater area, A. L. Larson (*Oklahoma Sta. Bul. 265 (1943), pp. 8, illus. 3*).—Data were secured by interviews with truck route operators and individuals hauling milk to the two creameries in Stillwater. At the time of the survey, 323 cans of milk per day from 190 patrons were handled on 11 truck routes, on which the trucks traveled 391 miles. Twenty-five individuals hauled 97 cans from 29 patrons per day and traveled 216 miles. A suggested plan of route is presented.

The suggested plan provides for adding isolated haulers to present truck routes and the formation of one new truck route. It would increase the daily mileage of truck routes 37 miles and would eliminate the 216 miles traveled by individual haulers. The reduction of 179 miles of travel per day in the total mileage would result in yearly savings of 65,335 miles of travel and about $7,600 for truck costs and labor.

Wartime motor truck transportation of fresh fruits and vegetables, C. W. Hauck (*Ohio Sta. Bimo. Bul. 221 (1943), pp. 57–59*).—Analysis is made of the truck operations, during the period October 12 to November 7, 1942, of 63 wholesale producers operating in or adjacent to the Northern Ohio Food Terminal, Cleveland.

Services of fruit and vegetable co-ops in the North Atlantic States, H. W. Mumford, Jr. (*U. S. Dept. Agr., Farm Credit Admin., Misc. Rpt. 61 (1943), pp. 38+*).—This is the third and final report of a survey made in 1940 of 99 associations handling fruits and vegetables in New England, New York, Pennsylvania, and New Jersey to assist them in making adjustments for added services for wartime. "This report is concerned with the kinds of services provided; the competitive situations in which the associations operate; the distribution of sales by months, by markets, and by buyers; and the financial position of the associations at the end of the 1940–41 season."

Where Frederick and Salisbury, Md., get their food supplies, R. F. Burdette and W. P. Walker (*Maryland Sta. Bul. A11 (1942), pp. 313–337+, illus. 5*).—The local production and consumption of farm products and the sources of food required for each of the cities and for farm families are described. Methods for increasing the consumption of local farm products are discussed.

Shipments [of dairy products] to Allied Nations, L. Spencer. (Cornell Univ.). (*Amer. Milk Rev., 5 (1943), No. 5, pp. 137, 166, illus. 1*).—The exports of different dairy products in 1942 are compared with previous years, especially

1919. Some data are included on the different products as to changes in storage holdings at the end of 1919 and 1942 and on the per capita consumption in the United States in 1935-39, 1942, and the anticipated consumption in 1943.

The total exports of dairy products in 1942 totaled 818.9 million pounds with a whole milk equivalent of 4,290 million pounds as compared with 901.6 million pounds and 2,744 million pounds, respectively, in 1919. The shipments of the three leading products in million pounds whole milk equivalent in 1919 and 1942, respectively, were—butter 726 and 370, cheese 142 and 3,121, and canned milk 1,876 and 771. The per capita consumption of all milk in the United States for human consumption averaged 806.4 million pounds in 1935-39, 851.8 in 1942, and 773.2 anticipated for 1943.

Crops and Markets, [April 1943] (*U. S. Dept. Agr., Crops and Markets, 20 (1943), No. 2, pp. 69-112, illus. 2*).—Included are crop, livestock, and market reports of the usual types, and tables showing by States the indexes of estimated value per acre of farm real estate on March 1 for different years, 1920, 1930, and 1933-43; average wage rates paid hired farm labor, 1942 and 1943; and the average prices received by farmers for different farm products on the fifteenth of January, February, and March 1943. An article, Cash Farm Income in 1942, includes tables showing by States for 1940, 1941, and 1942 the cash income from crops, livestock and livestock products, and Government payments, and the cash farm income received in the United States from different crops and groups of livestock and livestock products.

Feed consumption by livestock, 1910–41: Relations between feed, livestock, and food at the national level, R. D. Jennings (*U. S. Dept. Agr. Cir. 670 (1943), pp. 57+*).—This is a compilation and discussion of the national feed supply and its utilization. Tables, with discussions, show the amount of corn, oats, other grains, other concentrates, corn silage, hay, and other dry roughage fed by the years 1910-41; the changes in annual consumption of grains, concentrates, and semiconcentrated feeds from 1929-33 to 1938-40; the annual number of different types of livestock and amounts of livestock products 1940-41; and the number of different kinds of livestock converted to animal units (a unit equals one dairy cow). Other tables show the feeding value of common feed materials as compared with corn, the feed units of grain, commercial feed materials, miscellaneous concentrates, hay and other roughage, and pasture consumed annually 1929-33 and 1938-40; and the estimated quantities of the principal feeds used by the chief classes of livestock. The protein situation, the efficiency of livestock in converting feed into human food, and the uses that can be made of data concerning feed utilization are briefly discussed.

[Annual reports on tobacco statistics, 1939–41], C. E. Gage et al. (*U. S. Dept. Agr., Agr. Market. Serv., 1939, pp. 117+, illus. 1; 1940, pp. 112+, illus. 1; 1941, pp. 123+, illus. 1*).—These, the fourth, fifth, and sixth reports in this series (E. S. R., 82, p. 694), continue the tabular data.

Wartime prices and agriculture, P. R. Poffenberger and S. H. DeVault (*Maryland Sta. Bul. A18 (1942), pp. 181-211+, illus. 18*).—"This is the first of a series of reports on prices and presents the general trends of wartime prices and their probable influence upon agriculture."

Prices during World War I are briefly described. The movement of prices during World War II are discussed in sections covering the relation of factory employment and payrolls to prices, wholesale prices of all commodities, prices received and paid by farmers, wholesale prices of farm products, retail prices of foods, and cost of living. Maryland farm prices for beef cattle, hogs, veal calves, lambs, corn, and wheat are compared with United States prices and parity prices. The Emergency Price Control Act of 1942, what parity price means and how it is calculated, farm price ceilings, and the effect of price control on farm prices are discussed. Some suggestions are made to aid in preventing price inflation.

RURAL SOCIOLOGY

Population trends in New York State, 1900 to 1940, W. A. Anderson (*[New York] Cornell Sta. Bul. 786 (1942), pp. 71, illus. 15*).—Census data are tabulated, analyzed, and discussed.

"The rural population of the State decreased both numerically and relatively from 1900 to 1920. But from 1920 to 1940, there was a decided increase both numerically and relatively, so that over the whole period, 1900 to 1940, the rural population increased by 349,084 persons, or 18.4 percent. The increasing movement of population from cities into rural territory or suburban areas and the general practice of commuting account for this large net gain. The suburbanization process has gone on so rapidly in the past 20 yr. that not only were there large increases in the open-country nonfarm population, but also a slight increase of 9,366 persons in the rural farm population between 1930 and 1940. This is the first increase in farm population reported by the census since 1880."

Some social implications of the population shifts are discussed, and need of readjustments is indicated.

The emerging rural communities of [seven South Dakota counties] (*South Dakota Sta., Rural Sociol. Pams. 99 (1942), pp. 9+, illus. 8; 100, pp. [10], illus. 7; 101, pp. [11], illus. 8; 102, pp. [11], illus. 9; 103, pp. [11], illus. 8; 104, pp. [11], illus. 8; 105, pp. [9], illus. 6*).—The emergence of village-centered communities was studied in Brule and Sanborn Counties, by W. F. Kumlien, H. M. Sauer, and C. Scandrette; and in Brown, Edmunds, Turner, Clay, and Tripp Counties, by Kumlien and Scandrette.

The problem of declining enrollment in the elementary schools of South Dakota, W. F. Kumlien and C. Scandrette (*South Dakota Sta., Rural Sociol. Pam. 106 (1942), pp. 20+, illus. 13*).—This is a State-wide summary of a county series, with suggestions for solving the declining enrollment problems presented by a drop from 17.95 pupils enrolled in 4,453 common schools in the State in 1920 to 11 86 pupils in 3,958 schools in 1940.

The problem of declining enrollment in the elementary schools of [20 South Dakota counties], W. F. Kumlien, H. M. Sauer, and C. Scandrette (*South Dakota Sta., Rural Sociol. Pams. 73 (1942), pp. 10+, illus. 9; 74, pp. 9+, illus. 8; 79, pp. 10+, illus. 9; 81, pp. 7+, illus. 8; 82, pp. 8+, illus. 9; 83, pp. 11+, illus. 9; 84, pp. 7+, illus. 9; 85, pp. 10+, illus. 9; 86, pp. 11+, illus. 9; 87, pp. 8+, illus. 9; 88, pp. 11+, illus. 9; 89, pp. 13+, illus. 9; 90, pp. 7+, illus. 8; 91, pp. 6+, illus. 8; 92, pp. 8+, illus. 9; 93, pp. 6+, illus. 8; 94, pp. 5+, illus. 7; 95, pp. 7+, illus. 9; 96, pp. 5+, illus. 7; 97, pp. 9+, illus. 9*).—This study was conducted in the following counties: Haakon, Ziebach, Custer, Lyman, Bennett, Charles Mix, Jackson, Stanley, Meade, Potter, Perkins, Pennington, Mellette, Shannon, Jones, Todd, Washabaugh, Dewey, Washington, and Corson.

The problem of over-churched and under-churched areas in [Aurora and Marshall Counties] (*South Dakota Sta., Rural Sociol. Pams. 107 (1942), pp. 8+, illus. 9; 108, pp. 8+, illus. 9*).—A study of church attendance in Aurora County, by W. F. Kumlien, showed that more than 58 percent of the farm families attended town churches and about 24 percent attended open-country churches, while about 18 percent did not attend any church. A similar study, by Kumlien and C. Scandrette, in Marshall County gave corresponding percentage attendance of 54, 29, and 17. Both counties are reported as "distinctly over-churched" in spite of the existence of under-churched areas.

The social participation of farm families, W. A. Anderson and H. H. Plambeck (*[New York] Cornell Sta. Mimeog. Bul. 8 (1943), pp. 37+*).—This publication assembles and summarizes data, some phases of which have been noted (E. S. R., 86, p. 412; 89, p. 131). It deals with 1,205 farm families living in Cortland and Otsego Counties.

These families belonged to an average of 3.9 different organizations each. In Cortland County in 55 percent, and in Otsego County in 69 percent of the families, all persons 10 yr. of age or over belonged to at least one organization. Farm owner families in the two counties belonged, on the average, to more than four different organizations, farm tenant families to an average of three, and farm laborers to an average of two. The average number of organizations to which the families belonged increased progressively as the quality of the farm land on which they reside improved.

Over one-half of the most active family members did not attend as many as two meetings per month. In from 70 to 75 percent of the families in the two counties, no family member held an organization office. Program participation was engaged in by at least one member in only 24 percent of the Cortland and 26 percent of the Otsego families. Six out of 10 families had no member 10 yr. of age or over who was either an officer, served on a committee, or took part in a program.

Apparently the size of the family, as measured by the number of members at home, is not important in influencing participation, but it is either the families with no children at home or those with children 10 yr. of age and other that participate most. As the amount of schooling of the family heads increased, participation increased. In families where the schooling of the husbands and wives did not exceed eight grades the average participation score was 11, while where these persons had more than high school training it was twice as large. Families with the better standard of living as indicated by the possession of certain facilities also did the most participating. These operate the better farms and have the most security. Those families with automobiles, telephones, and radios participate much more than those without such facilities. It is the families on the poorer lands, and with the lower social and economic standards, who do not possess them. "Organizations in rural New York need to place greater stress on stimulating the nonparticipating families."

Membership relations in cooperative organizations, W. A. Anderson and D. Sanderson (*[New York] Cornell Sta., Mimeog. Bul. 9 (1943), pp. 32+*).—The authors concluded that some obstacles to cooperative organizations are a lack of knowledge on the part of members of the structure, methods of operation, and policies of their own organizations, and of the basic principles of the cooperative movement. Local cooperative associations are less criticized by members and command a higher degree of loyalty than do the larger, more centralized associations. Too many are members solely for the immediate financial advantage rather than long-time benefits. A major purpose of cooperation is to establish a system which assures the best prices possible with the best market or quality of goods over a long period.

FOODS—HUMAN NUTRITION

Food for people, M. G. Reid (*New York: John Wiley & Sons; London: Chapman & Hall, [1943], pp. 653+, illus. 31*).—Following a general introductory section, the economic and social aspects of food production and consumption are discussed in three main sections. "In the first part production is examined.

The expansion of commercial production is discussed with special reference to changes in method and their bearing on nutrition and social control. Considerable space is given to food production carried on by families for their own use. In the second part food consumption is discussed, attention being directed mainly to its status and to the factors affecting it, including price, income, and education. Status of nutritional health is examined. In the third section current problems bearing on food are considered, for example, taxes on food, the ever-normal granary, soil conservation, the food stamp plan, advertising, sanitation, grading, restraints of trade. Finally, controls to meet wartime food problems are discussed."

Numerous literature references, including many research reports from the experiment stations and the U. S. Department of Agriculture, are given as footnotes.

The study of nutrition in Latin America, P. A. Escudero (*Brit. Med. Jour., No. 4275 (1942), pp. 698–699*).—This is an abridged account of the organization and work of the National Institute of Nutrition at Buenos Aires. Six divisions of work coordinated under general direction are listed. The specific function of each is discussed, and an indication is given of the future work of the institute. "By the time the work of the institute reaches its full development it is hoped that health conditions in Argentina will have manifested very great improvement, owing to a recognition of what the founder of the institute has called the 'nonspecific prophylaxis' of diseases whose onset is due to simple maladjustments in living rather than to any specific cause."

Relation of hydrogen-ion concentration to color developed in cured pork, P. C. Duisberg and R. C. Miller. (Pa. Expt. Sta.). (*Food Res., 8 (1943), No. 1, pp. 78–87, illus. 5*).—The laboratory method developed as an approximation to actual curing conditions involved the use of 1-in. cubes of pork loin and a pickle solution containing 24 percent NaCl, 9 percent sucrose, 0.49 percent $NaNO_3$, and 0.057 percent $NaNO_2$. Control of micro-organisms was effected by placing the pickle solution and also the meat under the G. E. Germicidal Lamp for a period just before use and storing the glass-stoppered curing jar during the period of test in the refrigerator at 4° C. By the use of sucrose and the control of micro-organisms, there was no test for reducing sugar until about the seventh day of curing. pH measurements on the pork were made with the plunging glass electrode and on the pickle with the glass electrode. Color was determined with a Bausch and Lomb reflectance spectrophotometer.

After determination of the normal pH relationships between the curing pork and the pickle over a period of 160 hr., the study was varied in that the pH's of the curing pork and the pickle were changed by introduction of various buffer solutions, which permitted the normal pH relationships between pork and pickle to be maintained. Color relationships at the changed pH levels were determined. From the reflectance curves, it was evident that above a pH of 5 there was no relationship between pH and the color of the cured meat. At a pH between 5 and 6 the meat was tender and palatable. Between a pH of 4.4 and 4.9 the color fixation was inadequate, apparently not only because of nitrite destruction in the acid solution but also because the myohemoglobin was in some way decolorized at this pH range; nitric oxide myohemoglobin responsible for the reddish color of cured meat could not be satisfactorily formed, therefore, between pH 4.4 and 4.9. Below pH 4 the brownish gray color and lack of nitrite indicated no color fixation. Below pH 5 the meat was tough. At pH's alkaline to pH 7 the color fixation was normal but the meat became undesirably tender and even gelatinous above pH 7.5. These results indicated that a curing range between pH 5.2 and 6 was optimum. The behavior of the small cured pork samples agreed well with trial results with Boston butts, one cured with unbuffered pickle solution and the other with phosphate buffered solution, without control of microorganisms, for a period of many days.

Comparative shortening value of some commercial fats, L. R. Hornstein, F. B. King, and F. Benedict. (U. S. D. A.). (*Food Res., 8 (1943), No. 1, pp. 1–12, illus. 3*).—The breaking strength of pastries and modified shortbreads as determined with the shortometer was used as a measure of the relative shortening power of the 12 representative commercial fats used in this study. Since fats are subjected to mechanical working in the process of being incorporated into dough, a study was made of the consistency of the undisturbed fats and of the samples after cutting from 4 to 52 times with a grating of fine wires. Consistency was determined by penetrometer readings at 18°, 22°, and 26.5° C. The iodine number, free fatty acid, melting point, and congealing point of each fat were also determined.

As measured by the breaking strength of pastries mixed at 22° by machine, the best shortening agent was the hydrogenated vegetable oil No. 3, consisting of about 10 percent fully hydrogenated cottonseed oil dispersed in the oil. Refined steam-rendered lard, butter oil, and one of the butters ranked second; the sample consisting of a mixture of vegetable oils (largely cottonseed) partially hydrogenated, one of the butters, and hydrogenated lard ranked third; a partially hydrogenated cottonseed oil and the oleostearin cottonseed oil compound came next; then leaf lard and oleomargarine made from animal fat; and finally oleomargarine made from vegetable oil rated as the poorest shortening agent.

The temperature at which the pastry dough was mixed affected the shortening value of some fats more than others. The butterfats were affected most, since they were relatively poor shortening agents at 18°, but among the best at 22° and 26.5°. Hydrogenated vegetable oil No. 3 and refined steam-rendered lard were only slightly affected by changes in temperature and were excellent shortening agents. Oleomargarines produced the least tender pastries at 26.5° just as they did at 22°. There was no relationship between breaking strengths of machine-mixed and hand-mixed pastries and shortbreads (22° mixing temperature), nor did the shortometer scores agree with the tenderness scores of a panel of judges estimating the shortening value of the fats in the pastry. There was no correlation between breaking strengths of either pastries or shortbreads and the physical and chemical constants of the fats. In particular, the degree of unsaturation of the fat, as expressed by the iodine value, was a poor measure of its shortening power. There seemed to be no relationship at any of the temperatures used between the breaking strengths of the pastries and the consistency of the undisturbed fats, but at 22° there was a highly significant correlation between breaking strength and the worked consistency calculated at 8, 24, and 40 cuttings; the fats that became softest during the process of being incorporated into a dough had a tendency to form the most tender pastries. There was no significant correlation between the breaking strengths of shortbreads and either the consistency or the creaming power of the fats. The observed behavior of the fats is discussed in terms of their structure and composition.

Preliminary report on studies concerning the nutritional value of apples, R. S. Marsh. (W. Va. Univ.). (*Mountaineer Grower, 14 (1943), No. 146, pp. 4–12*).—Analyses by V. B. Fish of Grimes Golden, Delicious, Starking Delicious, York Imperial, Stayman Winesap, and Rome Beauty apples from Kearneysville, W. Va., and Grimes and Delicious varieties from Romney showed them to contain from 1.70 to 4.50 mg. of ascorbic acid per 100 gm. as received, but only from 1.50 to 2.80 mg. per 100 gm. after 2 months' storage, the decrease amounting to a loss of from 11.8 to 46.7 percent in the individual varieties. The Grimes and Delicious samples from Romney, containing 3.33 and 4 50 mg. per 100 gm., respectively, when first analyzed in the fall, were richer in ascorbic acid than the corresponding varieties from Kearneysville with a content of 2.59 and 1.96 mg., respectively. At the end of 2 months' storage, however, the two varieties from Romney contained 2.36 and 2.40 mg. as compared with 2 10 and 1.52 mg. in the samples from Kearneysville. These values indicate that apples are variable in their ascorbic acid content and are not a good source of this vitamin.

Determinations by L. Leonian of the B vitamins in Grimes, York, Delicious, Rome, and Stayman apples showed the following range of values expressed as micrograms per gram: Thiamin from 0.10 to 0.13, riboflavin from 0 08 to 0.12, pyridoxin from 0 31 to 0.43, inositol from 69 to 390, pantothenic acid from 0 55 to 0.70, niacin from 0 50 to 0.74, *p*-aminobenzoic acid from 0.22 to 0.38, and biotin from 0.008 to 0 014. Of the several varieties tested, Grimes was the best source of these vitamins.

In feeding tests with rats receiving 20 percent of the total weight of their daily food allowance as fresh apple, H. C. Cameron observed that the animals retained from 19 to 50 percent more of the nitrogen from their diet than did rats that did not receive the apples. This protein-sparing effect of apples is attributed to their malic acid content, and the results are in agreement with findings by other workers showing that the presence of organic acids aids in the retention of nitrogen from diets fed experimental animals.

Peanut butter as a source of thiamine, calcium, phosphorus, and iron, C. D. MILLER, L. LOUIS, and C. PETERSON. (Hawaii Expt. Sta.). (*Food Res., 8 (1943), No. 1, pp. 27–32*).—Three samples of smooth and one of coarsely ground peanut butter, made by large commercial concerns in four widely separated areas in the United States, were utilized in this study in which thiamin was determined biologically by a rat-growth procedure and Ca, P, and Fe by chemical methods, all as previously described for macadamia nuts by Miller and Louis (E. S. R., 87, p. 144). Thiamin varied from 324 to 450 µg. and averaged 380 µg. per 100 gm. The three smooth peanut butters were remarkably uniform in Ca content, averaging 0.034 percent, while the coarsely ground product contained 0.048 percent; this higher value was probably due to the higher salt content. The four samples averaged 0.038 percent Ca. The P contents, which were nearly uniform, averaged 0.404 percent. The Fe content varied from 0.00167 to 0 00198 percent, with an average of 0.00187. The data obtained are compared with those in the literature, and peanut butter as a source of thiamin is discussed.

Acidified vegetable juice blends, H. G. BEATTIE and C. S. PEDERSON. (N. Y. State Expt. Sta.). (*Food Res., 8 (1943), No. 1, pp. 45–53, illus. 6*).—Juices were extracted from celery, carrots, beets, onions, turnips, rutabagas, and red cabbage by means of a small juicer that grated the vegetable and separated the juice by centrifugal force, or, on a larger scale, by grinding the vegetable in a hammer mill and expressing the juice in a Chisholm Ryder continuous press. These juices, when acidified to pH 4 either with sauerkraut or rhubarb juice or with hydrochloric, phosphoric, or lactic acids, could be flash pasteurized at 180° F. with little loss of the characteristic vegetable flavor. Although the acids, except oxalic in rhubarb juice, could be used in smaller quantities than sauerkraut juice to change the pH of the blend, none of them gave a blend that was as satisfactory as those with sauerkraut juice. Carrot, celery, beet, onion, and turnip juice blended with sauerkraut juice could be further blended with tomato juice to give pleasing vegetable beverages. To determine the amount of acid required to adjust the H-ion concentration to definite pH values, the vegetable juices in measured aliquots were treated with measured amounts of the various acids or rhubarb or sauerkraut juice and the pH determined after each addition. The results when plotted showed typical buffer curves and showed also that it was impossible to predict the amounts of acid, either mineral or organic, necessary to adjust to any definite pH. This was due to the difference in buffer content of the various samples of juices and was further complicated by the varying content and acid normality of the different samples of sauerkraut and rhubarb juices. In preparation of the blends, therefore, it was necessary to carry out a preliminary adjustment of each lot of vegetable juice with each lot of acid before the actual blend was prepared.

Commercial brine preservation of vegetables, J. L. Etchells and I. D. Jones. (U. S. D. A. and N. C. Expt. Sta.). (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1943), No. 8, pp. 242–246, 251–253, illus. 2*).—This paper presents a generalized report of the principal phases of a study, now in progress, of brine preservation of certain vegetables. Brief recommendations are given (1) for the routine salting of green beans, peas, and lima beans cured in open unsheltered containers; (2) for the "low salt" acidified brine treatment for green beans, leafy vegetables (kale, mustard greens, spinach, and turnip greens, and carrots); and (3) for the salt-compression treatment of fresh, blanched green beans cured and stored in closed containers. The salted products (1) when desalted and cooked, resembled similar canned vegetables in appearance. The texture and flavor were somewhat altered but were entirely satisfactory. The low-salting procedure eliminated the necessity for desalting prior to cooking; with the exception of spinach, the products obtained by this procedure were in good condition, as judged by general appearance, flavor, and texture, and could be prepared for the table by merely washing and cooking.

Of the vegetables processed by procedure (1), the green peas retained about 50 percent of their original carotene, while the green beans and lima beans exhibited a considerably lower retention; ascorbic acid losses were practically complete in all cases. Green beans cured by the low-salting procedure in the closed containers retained a much higher proportion of their carotene than those processed in open containers as in procedure (1). Beans processed by procedure (3) showed that about 60 percent of the carotene and 15 percent of the ascorbic acid were retained. Leafy vegetables preserved in the low-salt acidified brine retained about half of their original carotene, while carrots similarly preserved showed little or no loss of carotene.

The nutritive value of dried fruits and vegetables, W. V. Cruess. [Univ. Calif.]. (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1942), Nos. 3, pp. 69–72, 91; 4, pp. 111–114; 22 (1943), Nos. 5, pp. 136–137; 6, pp. 171–174, 181*).—This review article presents quoted data and general information on the proximate composition and mineral and vitamin content of dried fruits and vegetables; discusses certain studies concerning the effect of dried fruits and vegetables on acid-base balance and their value in promoting blood regeneration in experimental hemorrhagic anemia; and summarizes the findings from a number of investigations on the effect of dehydration on the vitamin content of fruits and vegetables.

The dehydration of Rhode Island fruits and vegetables, P. H. Dykstra (*Rhode Island Sta. Misc. Pub. 16 (1943), pp. 4+*).—This brief report, based on preliminary trials using the type of drier and the methods described in U. S. D. A. Farmers' Bulletin 1918 (E. S. R., 88, p. 130), presents general instructions on the drying, storage, and cooking of dehydrated fruits and vegetables. Summary tables conveniently outline specific directions for beets, beet greens, spinach, soybeans, cabbage, corn, peppers, apples, cranberries, peaches, and pears. A number of references dealing with recent developments in home dehydration are cited.

Dehydration of cherries, E. M. MRAK, H. J. PHAFF, and H. FRIAR. (Univ. Calif.). (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1943), No. 7, pp. 198–201, 214*).—Experimental observations indicated that cherries should be picked at eating-ripe maturity to obtain the best dehydrated product. It was preferable to remove stems before drying, but the fruit could be pitted or left whole. With the several varieties of sweet cherries used in the drying tests (Black Tartarian, Bing, Lambert, Republican, and Royal Anne), the stems constituted from 0.25 to 1.7 percent of the fresh fruit and the pits from 7 to 14 percent. Pitting offered the advantage of reducing the weight but at the same time the disadvantage of added cost of preparation, loss of juice, much lower permissible trayload, and production of a sticky product reconstituting poorly. Steam blanching of whole cherries reduced drying time and gave a dried product of satisfactory appearance, but a mushy unacceptable product when soaked and cooked. Dipping of the sweet cherries in boiling 0.5 percent Na_2CO_3 for from 5 to 10 sec. usually served to check the skins, which were washed by dipping the cherries in cold water, although some varieties required increased dipping time or concentration. Overchecking had to be guarded against. The dipped cherries, then dehydrated at 150° F., gave a dehydrated product that did not case harden and that rehydrated quickly and gave a cooked product of desirable flavor and appearance. After dipping, Royal Anne cherries should be sulfured for from 15 to 30 min. and then dehydrated at 150°. Dark varieties should not be sulfured.

Dehydration of huckleberries, H. FRIAR and E. M. MRAK. (Univ. Calif.). (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1943), No. 5, pp. 138–139*).—The small California huckleberry, *Vaccinium ovatum*, was used in these experiments in which the washed berries were dehydrated without treatment, after steam blanching, after blanching and sulfuring, and after sulfuring without blanching. Dehydration was accomplished in an air-blast drier at several temperatures. The dried product was stored for 2 mo. at from 65° to 70° F. and then checked for flavor and cooking qualities. Trayloads of from 1 to 1½ lb. per square foot and drying temperatures of from 140° to 160° were used. At 160° care was necessary to prevent scorching and bleeding. A constant temperature of 140° and an air flow of 500 lineal ft. per minute dried the berries in about 13 hr. and gave an excellent finished product. Berries dried without any pretreatment were slightly superior in texture and flavor to those steamed or sulfured. Steaming caused bleeding and sticking. This was not sufficient to be serious with a ½-min. steam blanch, but was excessive with a 1- or 2-min. blanch. The drying time for unsteamed fruit was much longer, however, than that for the steamed fruit, and for this reason the use of a steam blanch of ½ min. or less prior to drying appeared to be the desirable procedure. Drying ratios ranged from 3.64:1 to 5.5:1, the average for fruit free of bleeding during drying being 4.25:1.

Small containers were more suitable than large ones for storage of the dried berries, since the large containers increased the possibility of caking and packing during standing. The dehydrated berries were refreshed by soaking in cold water or by simmering in a 30° Brix sirup for 15 min. Although the color of the juice and the berries was excellent, they did not regain their original plumpness; the blanched berries showed more rapid and greater uptake of water than did the unblanched product. The dehydrated berries were satisfactory for use in pies and sauces. Because they did not reconstitute very well, it was necessary in the preparation of bakery products to use a filler such as cornstarch. A formula for a huckleberry pie filler is given.

Dehydration of guavas, E. M. Mrak. (Univ. Calif.). (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1943), No. 6, pp. 170, 181*).—Six varieties of guavas grown in the experimental orchard of the Citrus Experiment Station at Riverside, Calif., were used in the dehydration tests. The fruit was quartered, seeded, steam-blanched, or sulfured and then dehydrated in an air-blast drier at 130° or 150° F. The waste, which consisted almost entirely of seeds, ranged from 21 to 45 percent of the gross weight of the fruit, depending on the variety. At 130° drying required from 11 to 15 hr. and at 150° from 9 to 19 hr., the increased time at this higher temperature being required by the two varieties which case hardened at 150°. Other varieties dried in less time at the higher temperature. Drying was considered sufficient when pieces of the dried fruit cooled to room temperature would break with a snap rather than bend under pressure. Drying ratios varied from 5.2:1 to 6.9:1. Samples steam-blanched and dehydrated at 130° contained from 280 to 1,780 mg. ascorbic acid per 100 gm. in the different varieties; those steam-blanched and dehydrated at 150° contained from 170 to 1,480 mg. per 100 gm.; while those sulfured 20 min. and dehydrated at 150° contained from 400 to 1,890 mg. per 100 gm. Since sulfuring facilitated retention of the ascorbic acid, that process was recommended for drying. An air flow of 600 lineal ft. per minute and an initial relative humidity of 25 percent were found satisfactory for good drying. The dehydrated guavas were thin, dull, and brittle. Some varieties showed occasional crystals on the inner surfaces. The dried product reconstituted well and was satisfactory for use as a cooked fruit or in a variety of desserts.

Shipping dried fruits to the Tropics, P. E. Nichols and H. M. Reed. (Univ. Calif.). (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1943), Nos. 7, pp. 206–208, illus. 1; 8, pp. 247–249, illus. 6*).—This article presents a summary of results obtained several years ago in an investigation of the quality of dried fruit shipped to Manila, some of which was examined immediately, some upon reshipment to San Francisco, and some following storage for 10 mo. in Manila and reshipment to San Francisco. Samples returned to San Francisco were compared with paired lots that had been held there in laboratory storage for the period of the tests. The chief findings are summarized as follows:

"(1) The cartons tried were unsatisfactory for dried fruit storage under tropical conditions, chiefly because they were not insect-proof. (2) Cartons protected the color of apricots about as well as did cans, but apples and pears lost sulfur dioxide and deteriorated in color faster than in cans. (3) Elevated storage temperatures increased the rate of spoilage, especially the deterioration of color. The keeping quality of all fruits in sealed containers at 32° F. was good for a period of 2 yr. (4) Within the limits tried the length of preservation of color in all fruits was proportional to the sulfur dioxide content. The critical sulfur dioxide content appeared to be for apples about 500 p. p. m., for apricots about 1,000 p. p. m., and for pears about 1,200 p. p. m. (5) Apricots deteriorated most rapidly and apples least rapidly of the three cut fruits tested. Prunes kept well."

As a result of the experiments the following recommendations are made: "(1) Sealed tin or glass containers should be used for shipment of dried fruits to the Tropics. (2) When packed for shipment to the Tropics, the minimum sulfur dioxide content of apples should be 1,000 p. p. m.; for apricots, peaches, and pears, 2,000 p. p. m. (3) These fruits should be processed, resulfured, and repacked when the sulfur dioxide content declines to 500 p. p. m. in apples, or to 1,000 p. p. m. in apricots, peaches, and pears. (4) Vacuum sealing is preferable but may be dispensed with if the fruit is to be processed, resulfured, and repacked. (5) Cold storage facilities, whenever available, should be used for dried fruits in the Tropics. (6) Processing and resulfuring were distinctly beneficial to the keeping quality as compared to the 'natural condition.' (7) Vacuum-packed cans gave the best protection and were slightly better than cans filled with inert gas (hydrogen), and this in turn was better than air-packed cans."

Metabolism and growth rate of rats, H. H. KIBLER and S. BRODY. (Mo. Expt. Sta.). (*Jour. Nutr., 24 (1942), No. 5, pp. 461–468, illus. 2*).—Day-by-day oxygen consumption measurements made in an 8-chamber Regnault-Reiset volumetric-type apparatus similar in principle to the 4-chamber apparatus for fowls described by Winchester (E S. R., 83, p. 672) are reported for each of three litters of rats (seven, eight, and nine animals per litter) from birth to weaning at 22 days and on eight individual rats equally divided as to sex, with six from the nine- and two from the eight-rat litters from 24 to 121 days. Fasting data are also reported for intervals beginning with the thirty-second day. The essential data are given in tables and graphs and summarized as follows:

"The metabolic rate rises from about 550 Calories per square meter per day in early infancy (the low values perhaps being due to low muscle tonus and low endocrine activity) to 1,100 basal or 1,200 nonbasal at the age of 45 days or at a body weight of 100 gm. Thereafter it declines to 800 basal and 850 nonbasal, the decline in metabolic rate tending to parallel the decline in percentage growth rate. The decline in metabolic rate (as in growth rate) with increasing body weight is more rapid in the females than in the males. When total metabolism is plotted against body weight on logarithmic paper, the resulting distribution exhibits 'breaks' which apparently are associated, in part, with changes in percentage growth rate."

Body fats in rat acrodynia, F. W. QUACKENBUSH and H. STEENBOCK. (Wis. Expt. Sta.). (*Jour. Nutr., 24 (1942), No. 4, pp. 393–398*).—A study was made of the amount and iodine value of the body fat and liver fat of rats at weaning, after severe acrodynia had developed, and after the various supplements of the earlier study had been fed for 3 weeks.

The animals from stock diet contained more than twice as much fat at weaning as did those from a potato meal diet (E. S. R., 81, p. 600). With the development of acute acrodynia, the animals lost a large part of their body fat but the residual fat was more highly unsaturated. No change in quantity or quality of the fat was brought about by the feeding of either pantothenic acid or pyridoxin alone. Linoleic acid, rice bran concentrate, and pyridoxin with pantothenic acid, all of which cured or alleviated the symptoms, increased the total fat and decreased the iodine number of the fat. A similar trend was noted in the liver fat. Fatty acids from acrodynic rats or rats cured with rice bran concentrate did not cure the acrodynia, indicating that little if any fatty acids had been stored during the production of the acrodynia and that no marked synthesis had resulted from the feeding of the rice bran concentrate.

The influence of thiamine, riboflavin, pyridoxine, and pantothenic acid deficiencies on nitrogen metabolism, B. SURE and Z. W. FORD, JR. (Ark. Expt. Sta.). (*Jour. Nutr., 24 (1942), No. 5, pp. 405–426*).—In this investigation in which the partition of the nonprotein nitrogen of the blood and urine was studied in thiamin, riboflavin, pyridoxin, and pantothenic acid deficiencies in the rat, the paired feeding technic described by Sure and Dichek (E. S. R., 86, p. 426) was followed. Because of the large number of blood and urine determinations involved, detailed results are not presented but all of the blood data have been grouped and averaged, and the urinary data have been subjected to statistical analysis according to the Student method.

In thiamin deficiency there were large urinary excretions of ammonia, creatine, and preformed creatinine. The relationship was significant between the excretion of preformed creatinine and body weight but not between creatine and body weight. The increase in total nonprotein nitrogen and urea in the blood was large even in mild chronic states of thiamin deficiency. In riboflavin deficiency (advanced stages) the excretion of ammonia was large, there was a moderate creatinuria, and a small reduction in allantoin excretion. In pyridoxin deficiency (mild stages) there was a mild creatinuria, a reduction in uric acid excretion, and a marked retention of creatinine and uric acid in the blood. In pantothenic acid deficiency there was moderate creatinuria and a small reduction in allantoin excretion. In the terminal stages of the deficiency there were increases in the total nonprotein nitrogen and urea of the blood.

Thiamin content of fresh and frozen vegetables, J. C. Moyer and D .K. Tressler. (N. Y. State Expt. Sta.). (*Food Res., 8 (1943), No. 1, pp. 58–61*).—A previous study (E. S. R., 88, p. 438) having shown that peas and asparagus contained sufficient thiamin to make a significant contribution to the diet, the present study was directed at determining how well these vegetables retained their thiamin during freezing and frozen storage. The thiamin content was determined, by the thiochrome technic previously employed, when the vegetables were freshly harvested, at various stages in the processing, and after freezing. The asparagus harvested at the beginning of the season contained 1.80 µg. thiamin per gram when graded, washed, and cut for blanching, and 1.52 µg. per gram when frozen; that harvested at the end of the season contained 1 84 and 1.46 µg. per gram at these two stages. The figures indicated thiamin losses of 16 and 20 percent during processing. The Thomas Laxton peas used in the early season contained 3.11 and 2.83 µg. of thiamin per gram when freshly harvested and after freezing, respectively, while corresponding values for the Telephone peas used in the late harvest were 4.33 and 3.36 µg. per gram. In the peas the thiamin losses in freezing were 5 and 25 percent for the early and late season lots, respectively. Analyses for the content at various stages of processing showed that the greatest loss occurred in the operation of blanching and cooling, or quality separation, and that freezing in itself caused little or no loss of the vitamin. Delays in the processing of one lot of peas showed that this vegetable could be held for some time (in the present case 19 hr.) at room temperature without any destruction of the thiamin. Samples of commercially frozen asparagus and peas stored for 7 and 5 mo., respectively, at —12°, —22°, and —40° C. showed no significant loss of thiamin in the storage.

The thiamine requirement of the albino rat as influenced by the substitution of protein for carbohydrate in the diet, W. W. Wainio. (Pa. Expt. Sta.). (*Jour. Nutr., 24 (1942), No. 4, pp. 317–329*).—In this study conducted on adult rats, urinary pyruvate excretions, determined by the method of Lu (E. S. R., 82, p. 587), were used as the index of subacute thiamin deficiency. On a diet high in sucrose (containing 64 percent sucrose, 20 percent casein, and 10 percent hydrogenated cottonseed oil plus cellulose flour, salts, and pure vitamin supplements), 10 rats weighing nearly 400 gm. and maintained in approximate energy equilibrium at 26°–30° C. were found to have a thiamin requirement of 33 µg., while on a diet high in protein (64 percent casein, 19.6 percent sucrose, and 10 percent hydrogenated cottonseed oil, representing a 9 percent decrease in energy intake), 9 of the same lot of rats had an average thiamin requirement of 20 µg. This 39 percent reduction in the daily requirement of thiamin is thought to indicate that thiamin participates in the oxidation of proteins to the extent of the glycogenic amino acids which they contain.

The effect of vitamin B deficiency on the intestinal absorption of galactose in the rat, A. H. Free and J. R. Leonards (*Jour. Nutr., 24 (1942), No. 5, pp. 495–502*).—In the present study one member of each of 38 litter-mate pairs of rats was given a diet deficient in the vitamin B complex and the other the same diet supplemented with 5 gm. of brewers' yeast per 100 gm. of diet.

After from 30 to 45 days on the diet when the animals showed marked loss in weight and deficiency symptoms, they were fasted for 24 hr., during the last 12 hr. of which water was also withheld, and were then offered a volume of 25-percent galactose solution sufficient to supply 6 gm. of galactose per kilogram body weight. This was voluntarily consumed in all cases within 3 min., and exactly 1 hr. later the jugular vein was severed for the collection of a 0.1-cc. sample of blood, the animal was then decapitated, and the stomach and intestines removed. The blood was analyzed for galactose by determination of nonfermentable reducing substances and the stomach and intestinal contents by saturating a portion of hot water solution of the contents with dry picric acid and testing the filtrate by the method of Myers and Bailey, reading the color with an Evelyn photoelectric colorimeter. Absorption coefficients were calculated as milligrams galactose absorbed per 100 gm. body weight per hour.

The rate of intestinal absorption of the controls averaged 35 percent more than that of the deficient animals, although the rate of gastric emptying was approximately the same in the two groups. In nearly every case the blood galactose levels were higher in the controls than in the deficient animals, the average values being 487 and 402 mg. per 100 cc., respectively. These results are thought to demonstrate an impairment of intestinal absorption in vitamin B complex deficiency. No attempt was made to determine which member of the complex contributed to the impairment. It is pointed out that the animals of the experiment were somewhat analagous to human beings subsisting on diets deficient in various members of the B complex rather than in a single member.

Factors affecting the riboflavin content of the liver, G. C. Supplee, O. G. Jensen, R. C. Bender, and O. J. Kahlenberg (*Jour. Biol. Chem., 144 (1942), No. 1, pp. 79–85, illus. 5*).—The plan followed in this study of the riboflavin concentration in the livers of rats after the ingestion of food and the injection of riboflavin, thiamin, pyridoxin, and pantothenic acid subsequent to previous lack of each of these factors involved the depletion of large groups of rats at weaning of the particular factor to be studied by omitting this from a basal ration identical for each group. Following the preliminary treatment, the animals were fasted for 24 hr. and then given by forced feeding 1 gm. of the basal ration in semifluid form, and the appropriate factors singly or combined, usually in 100-μg. quantities in 0.5 cc. of physiological salt solution, were injected directly into the heart. Animals receiving food only served as controls. At intervals of 4 hr. at least four animals of each group were sacrificed for liver analyses.

The riboflavin content of the liver tissue increased during digestion and assimilation of food even in animals depleted of riboflavin for several weeks. The mobilization of riboflavin in the animals not injected with the vitamin was relatively slow, the peak not being reached until after from 12 to 16 hr., following which the level decreased rapidly to the preceding level. In animals injected with riboflavin the increase in liver riboflavin was more rapid and the decline less abrupt. During digestion and assimilation of the basal diet in thiamin-depleted animals, the increase in liver riboflavin was relatively slight, but thiamin replenishment of the depleted tissues by feeding restored the riboflavin mobilizing function. Pantothenic acid had an even more marked effect on mobilization of riboflavin, but the effect of pyridoxin was very slight.

Niacin in pork, F. W. Christensen, D. Knowles, and A. Severson (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 4, pp. 11–14*).—In this study of the effect of the ration on the niacin content of pork, young pigs averaging about 45 lb. at the start were placed in groups of 3–5 on a basal niacin-free feed mixture with or without nicotinic acid supplement. The supplement was given at levels of 100, 300, or 500 mg. per head daily; one control lot was given the feed mixture plus alfalfa pasture. Livers, loins, and hams were analyzed in control groups at the beginning of the experiment and in control and test groups after periods of 113–138 days. Livers of pigs killed at the start of the experiment contained 15.68 mg. of nicotinic acid per 100 gm., a value higher than that for any of the groups fed throughout the test. Loins averaged 4.32 mg. per 100 gm. in the control group at the beginning, whereas the values for the test groups receiving nicotinic acid ranged from 7.35 to 8.89 mg. in increasing order as the amount of the supplement increased; similarly, hams averaged 5.97 at the beginning and increased to values of 7.40–8.78 after the period of feeding the nicotinic acid supplements. Negative control groups continued throughout the experiment and the group receiving alfalfa showed no increase in nicotinic acid content of these tissues over the values observed at the beginning. These results indicate that pork liver is measurably richer in nicotinic acid than are the muscle tissues, but that the content of this vitamin in the liver is not influenced by the nicotinic acid level of the feed. Muscle tissues, on the other hand, appear to be influenced by the amount of this vitamin in the feed. Alfalfa apparently furnishes no available nicotinic acid.

Ascorbic acid content of strains of snap beans, B. L. Wade and M. S. Kanapaux. (U. S. D. A.). (*Jour. Agr. Res.* [*U. S.*], *66* (*1943*), *No. 8, pp. 313–324, illus. 1*).—In preliminary experiments it was found that stage of maturity made only very slight differences in the ascorbic acid content of snap beans. Leaves had the highest ascorbic acid content, followed in order by stems, pods, and roots. In general, the high-quality varieties had much less ascorbic acid than the more fibrous varieties.

The major experiment involved 46 hybrid strains and 3 commercial varieties grown in lattice square arrangements at Charleston, S. C. Spring and fall crops with four pickings of pods each are reported. Determinations were made on leaves corresponding as closely as possible in each case to second and fourth pickings of pods. Significant varietal differences were found for each picking and for all pickings in both the spring and the fall crop. The strains tested varied from 19.1 mg. per 100 gm. to 28.7 mg. in the spring and from 16.2 to 26.4 mg. in the fall. In general, strains ranking high or low in ascorbic acid in the spring had a similar rank in the fall. Significant strain differences were found for ascorbic acid content of leaves. Leaves averaged much higher in the fall than in the spring. Correlation studies between ascorbic acid content of leaves and pods, and of leaves and of pods with manganese content of the soil, were made.

The stability of vitamin C in small fruits, R. A. Lineberry and L. Burkhart. (N. C. Expt. Sta. and U. S. D. A.). (*Fruit Prod. Jour. and Amer. Vinegar Indus.*, *22* (*1943*), *No. 6, pp. 164–165, 177, illus. 1*).—The stability of ascorbic acid as affected by temperature and mechanical injury was investigated in small fruits sampled with care to minimize sampling variations and analyzed for ascorbic acid as described by Burkhart and Lineberry (E. S. R., 88, p. 713). Twenty-three varieties of strawberries, including 11 seedlings, stored in whole, sound condition at 5° C. averaged 57.0 mg. ascorbic acid per 100 gm. (range 40.5–75.9 mg.) after 1 day, 54.9 mg. (range 41.3–78.3 mg.) after 2 days, and 55.5 mg. (33.5–74.0 mg.) after 3 days of storage. Seven of the seedling varieties stored at room temperature (about 25°) averaged 67.8 mg. per 100 gm. (50.0–85.3 mg.) after 1 day and 72.6 mg. (65.4–82.2 mg.) after 2 days; after the third day the berries had deteriorated and only traces of ascorbic acid were detectable. At a storage temperature of 40°, 6 varieties averaged 52.6 and 54.3 mg. ascorbic acid per 100 gm. after 1 and 2 days, respectively, with deterioration of the fruit and almost complete loss of the vitamin on the third day. When capped and held at 25°, 7 varieties averaging 52.5 mg. per 100 gm. at the beginning contained on an average only 45.5 mg. and 6.0 mg. per 100 gm. after holding 1 and 2 days, respectively. When punctured to simulate bruising there was a decrease from 62.5 mg. (average 7 varieties) at the beginning to 41.7 mg. after 1 day and to less than 1 mg. after 2 days. Strawberry juice held at 25° was variable in that 2 varieties lost nearly all the ascorbic acid in 2 days, while 3 other varieties retained about half the original amount in the same period of storage.

The ascorbic acid content of blueberries, averaging 20.3 mg. per 100 gm., remained nearly constant for 4 days of storage at 5° and had decreased only to 11.3 mg. per 100 gm. even after 6 days. Blackberries, dewberries, and raspberries, containing from 20.9 to 30.4 mg. ascorbic acid per 100 gm. at the beginning, retained from 9.3 to 33.1 mg. after 2 days' storage at 5°, but lost the vitamin rapidly after this period. These results indicate that the small fruits, if free from mechanical injury and shipped under good conditions, would not lose an appreciable amount of their ascorbic acid within 48–72 hr. after harvesting. With storage at temperatures of 25° or 40°, the vitamin loss from sound berries would not be appreciable in 2 days, but would be rapid if the fruit were capped, sliced, punctured, or juiced. Blueberries would retain their ascorbic acid longer than the other berries, this relative stability probably being associated with the impervious nature of the skin.

Effect of different cooking methods on the vitamin C content of quick-frozen broccoli, B. Barnes, D. K. Tressler, and F. Fenton. (N. Y. State Expt. Sta. coop. Cornell Univ.). (*Food Res., 8 (1943), No. 1, pp. 13–26*).—The broccoli used in the present study was of the Italian green sprouting variety grown in Oregon and prepared and frozen as a regular commercial pack; it was held, prior to receipt at the laboratory, in a commercial refrigerated warehouse. Ascorbic acid, determined by the method of Mack and Tressler (E. S. R., 78, p. 154), varied in the different stalks of the quick-frozen broccoli from 74 to 100 mg. and averaged 88 mg. per 100 gm. Variations within the stalk were also observed, the upper ¾ in. containing as much as 40 mg. per 100 gm. more ascorbic acid than the lower ¾ in., and the stem averaging 107 mg. as compared with 60 mg. per 100 gm. for the bud. The small amount of frost (10–30 gm.) present in each package contained ascorbic acid in the concentration of from 18 to 30 mg. per 100 gm. Partial defrosting before cooking, necessary in some cases to obtain a uniformly done product, was accomplished by permitting the frozen sample to stand at room temperature (78° F.) for 1¼ hr. or in the refrigerator at 40° for 4 hr. This caused no destruction of ascorbic acid, but defrosting in the refrigerator at 40° for 16 hr. caused a 6-percent loss.

In the cooking tests the composition of the cooking utensil was found to have no influence on the amount of ascorbic acid dissolved or the amount destroyed, and in the boiling tests little difference resulted by having the pan covered or uncovered. Variation in the amount of cooking water affected the retention of the ascorbic acid in the boiled broccoli; 300-gm. samples of the solidly frozen broccoli boiled in 100, 500, and 1,000 cc. of water (for 5½ min.) retained, respectively, 82, 57, and 53 percent of the ascorbic acid originally present. In each case only about 10 percent of the vitamin was destroyed in the cooking, so that the variation in retention was due to increase in the amount of the vitamin dissolved in the cooking water as the volume increased. When boiling periods increased from 2 to 5½ to 11 min., retentions varied from 64 to 57 to 55 percent. Here again, difference in the amount of ascorbic acid retained was due chiefly to increase in the amount of the vitamin dissolved, since the actual destruction of the vitamin was practically the same (from 11 to 12 percent) in these tests. When the slightly defrosted broccoli was steamed, about 80 percent of the vitamin was retained; when cooked in pressure saucepans of two makes, from 76 to 80 percent of the vitamin was retained, from 12 to 9 percent was dissolved, and from 12 to 11 percent was destroyed. When the solidly frozen broccoli was cooked in the pressure saucepan, the product was not uniformly cooked and 72 percent of the vitamin was retained, while 10 percent went into solution and 18 percent was destroyed. With cooking in the standard pressure cooker, 58 percent of the ascorbic acid was retained, but the product was not acceptable. Slight overcooking in the pressure saucepan increased the vitamin loss but had little effect in boiling the broccoli. The quick-frozen broccoli stored at 0° to −10° did not lose ascorbic acid in 5 months' storage, but cooked broccoli lost 19 percent of the vitamin upon standing in the refrigerator at 40° for 24 hr. and 34 percent on standing 48 hr.

The availability for human nutrition of the vitamin C in raw cabbage and home-canned tomato juice, M. M. Clayton and R. A. Borden. (Maine Expt. Sta.). (*Jour. Nutr., 25 (1943), No. 4, pp. 349–360, illus. 1*).—The method used in the present study was similar to that described in an earlier report on potatoes (E. S. R., 84, p. 426), the principal difference being that the diet was kept potentially neutral in reaction and that the subjects were saturated before each test period by the consumption of 200 mg. of ascorbic acid daily for a week. The actual experiment lasted for 51 days divided into six periods as follows: Saturation, 7 days; vitamin C tablets, 75 mg. daily for 9 days; saturation, 9; cabbage, 9; saturation, 8; and tomato juice, 9 days. In the experimental periods the total ascorbic acid was furnished by that in the basal diet (about 10 mg.) plus 25 mg. of ascorbic acid plus enough raw cabbage or home-prepared tomato juice to furnish by actual analysis 50 mg. of ascorbic acid. The cabbage was fed in place of the green beans and raw carrots of the basal diet and the tomato juice in place of apricot juice. The substitution of cabbage changed the calculated acid base values to faintly acidic and of tomato to slightly basic.

Three of the four subjects showed a somewhat lower ascorbic acid excretion during both the cabbage and tomato juice periods than during the ascorbic acid period. Two excreted slightly less ascorbic acid on cabbage than on tomato juice and the other two on tomato juice than on cabbage. The ascorbic acid content of the blood plasma amounted to 1 mg. or over per 100 cc. (0.94 mg. in two subjects in one test) in the three saturation tests. In the ascorbic acid period the values ranged from 0.54 to 0.93 mg. per 100 cc., in the cabbage period from 0.78 to 1.18, and in the tomato juice period from 0.78 to 0.98 mg. per 100 cc. "Judging from the results of both blood and urine analyses, the vitamin C of both raw cabbage and tomato juice was utilized as well as, or possibly better than, that in the tablets. An average of 116 mg. of the cabbage or 208 cc. (⅞ cup) of the tomato juice used in this experiment provided 50 mg. of vitamin C."

Ascorbic acid requirement of individuals in a large institution, M. K. Horwitt (*Soc. Expt. Biol. and Med. Proc., 49 (1942), No. 2, pp. 248–250*).—In this preliminary report average fasting plasma ascorbic acid values obtained during March to June, inclusive, are reported for different groups in a large mental hospital as follows: Average patients (380 subjects) 0.20 mg. per 100 cc., patients purchasing fresh fruits at the commissary (76) 0.38, infirmary patients given fruit juices (40) 0.56, patients serving as dining room attendants and receiving the staff diet (54) 0.80, and staff members (30) 1.0 mg. per 100 cc. Supplementing the regular diet (furnishing about 25 mg. of ascorbic acid daily) of a group of patients with 50 mg. of ascorbic acid every other day led to a steady increase in plasma ascorbic acid to more than 0.7 mg. per 100 cc. From this it is concluded that 50 mg. of ascorbic acid per day is sufficient to keep sedentary individuals in positive balance. Attention is called to the practical problem of supplying sufficient vitamin C to individuals fed from kitchens in which several thousand meals a day are prepared on a limited budget.

"While the addition of purified vitamins to the diet should always be considered as an inferior substitute to the use of the proper foods, there are times when the proper foods are not so easily available and the addition of the purified vitamin is justifiable. In the case of ascorbic acid the synthetic substitute is considerably less expensive than the fresh or canned food—approximately 1 ct. per week per patient—and it is a simple matter to add ascorbic acid to some of the food after it is cooked."

TEXTILES AND CLOTHING

Reclaimed wool proves less durable, H. M. Ward (*South Dakota Sta. Rpt. 1942, p. 55*).—This progress report (E. S. R., 87, p. 608) is based on the results of wear tests of four flannel fabrics of various blends of virgin wool and high-quality sweater clips. These fabrics were made into skirts and issued to college girls for a wear period of 1,000 hr., during which time there were seven dry cleanings. Physical and chemical tests made on the blends after dyeing, after the wear period, and after a storage period equivalent in time to the wear period showed that the blending of virgin and reclaimed wool resulted in a loss of warp breaking strength of the fabric. The percentage loss, based on the strength of the 100 percent virgin wool, ranged from about 12 to 46 percent, the latter percentage being found in fabric containing 25 percent virgin wool and 75 percent reclaimed wool. Both nitrogen and sulfur contents of the fabrics tended to decrease as the percentages of reclaimed wool increased; these evidences of chemical deterioration were usually more pronounced after wear than after storage. These results do not support the belief that wool fibers reclaimed from unused knit fabrics are not damaged sufficiently to seriously diminish their original natural intrinsic protective and service qualities.

REPORTS AND PROCEEDINGS

Annual Report [of New Haven Station] for the year ending October 31, 1942, W. L. Slate (*Connecticut [New Haven] Sta. Bul. 468 (1943), pp. 53–95*).—Activities for the year are summarized for the departments of analytical chemistry, biochemistry, entomology, forestry, plant breeding, plant pathology and botany, and soils, and for the Tobacco Substation.

Annual report of the director [of Delaware Station], 1942, G. L. Schuster (*Delaware Sta. Bul. 238 (1942), pp. 35, illus. 4*).—The activities of the year are briefly summarized for the departments of agricultural economics, agronomy, animal and poultry industry, chemistry, entomology, horticulture, and plant pathology.

Agricultural research in New Hampshire: Annual report of the director of the Agricultural Experiment Station for the period ending June 30, 1942, M. G. Eastman et al. (*New Hampshire Sta. Bul. 345 (1943), pp. 69, illus. 5*).—Brief summaries, in part noted elsewhere in this issue, are given of the work in progress or completed during the 18 mo. ended June 30, 1942, in agricultural economics, including land use in Grafton County, credit problems in wholesale milk areas, and areas of supply and channels for marketing milk; dairying, including causes of an abnormal ratio of fat to solids-not-fat in milk and investigations of bovine mastitis; field crops and soils, including pasture clearing and management, legumes on neglected hay lands, rotation tests including sweet corn and potatoes, bacterial ring rot of potatoes, variety tests of oats, and the influence of soil texture, soil moisture, and soil aeration upon growth in plants; forestry, including a determination of the supply of low-grade wood available for manufacture into plastics; fruits and vegetables, including the marketing of McIntosh apples, winter injury, spray management, establishment and development of lowbush blueberries, variety tests of strawberries, peaches, and tomatoes, disease resistance in tomatoes and muskmelons, and squash storage; control of insects, including the penetration of oils into insect eggs, nature of the insect epicuticle, and the technic for utilization of houseflies in studies of toxicants; nutrition studies with dairy cattle; energy expended by a horse at work; poultry, including the protein requirement of chickens, cause and prevention of gizzard lesions, litter moisture, and the influence of size of eggs on hatchability, rate of growth, and feed consumption of crossbred broiler chicks; experiments with gerbera culture in the greenhouse; and sheep breeding.

Agricultural research in South Dakota: Fifty-fifth Annual Report [of South Dakota Station, 1942], I. B. JOHNSON ET AL. (*South Dakota Sta. Rpt. 1942, pp. 78+, illus. 4*).—In addition to an article noted on page 405, progress reports are made on studies of soils; crops and crop breeding; livestock, dairy, and poultry production; livestock diseases, parasites, and poisoning; fruits and vegetables; crop insects; farm engineering; and farm income and community welfare.

Proceedings of the Association of Land-Grant Colleges and Universities (*Assoc. Land-Grant Cols. and Univs. Proc., 56 (1942), pp. 241+*).—This report deals with the fifty-sixth annual convention held at Chicago, Ill., October 28–30, 1942, discussed editorially (E. S. R., 88, pp. 1–2, 145).

MISCELLANEOUS

Workers in subjects pertaining to agriculture in land-grant colleges and experiment stations, 1942–43, B. T. RICHARDSON (*U. S. Dept. Agr., Misc. Pub. 510 (1943), pp. 174+*).—This is the usual annual list (E. S. R., 87, p. 880) of the workers in agriculture and home economics in the land-grant colleges and experiment stations, the personnel of the Office of Experiment Stations, and the officers and standing and special committees of the Association of Land-Grant Colleges and Universities.

Federal legislation, rulings, and regulations affecting the State agricultural experiment stations (*U. S. Dept. Agr., Misc. Pub. 515 (1943), pp. 43*).—A revision of Miscellaneous Publication 348 (E. S. R., 81, p. 603).

Colorado Farm Bulletin, [April–June 1943] (*Col. Farm Bul. [Colorado Sta.], 5 (1943), No. 2, pp. 15+, illus. 5*).—In addition to three articles noted elsewhere in this issue, this number contains the following: Selection of High-Value Crops Will Produce More Food Per Unit of Space in War Garden, by R. T. Burdick and A. M. Binkley (pp. 2, 10); Here's a Handy Guide for Calculating Rental Charges on Farm Machinery Per Crop Acre, by R. T. Burdick (pp. 3–5); and Several Substitutes for War-Short Bean Insecticides Found Satisfactory in Tests, by G. M. List (pp. 9–10).

List of bulletins of the Ohio Agricultural Experiment Station (*Ohio Sta. Spec. Cir. 62, rev. (1943), pp. 12*).—A subject list.

NOTES

Arkansas University and Station.—Dr. C. O. Brannen has been appointed director of the station as of July 1, and also director of the university bureau of research, which has been set up for the purpose of coordinating all research work in the university. Former Director W. R. Horlacher will continue as dean of the College of Agriculture and director of extension.

Illinois University and Station.—Wesley P. Flint, chief entomologist of the Illinois State Natural History Survey since 1917 and of the station since 1930, died June 3 at the age of 60 years. A native of New Hampshire and a graduate of the New Hampshire University in 1906, he had been continuously associated with the entomological work in Illinois since 1908. He was widely known for his contributions to economic entomology, especially those on chinch bug and onion maggot control, protection of corn from stored insects, and the European corn borer. He had been president of both the Entomological Society of America and the American Association of Economic Entomologists.

The retirement as of September 1 is noted of Drs. J. W. Lloyd, professor and chief in fruit and vegetable marketing, after 44 years of service to the institution, and M. J. Prucha, professor and chief of dairy bacteriology, after 30 years of service.

Purdue University and Station.—David E. Ross, president of the board of trustees since 1927, died on June 28. He was an alumnus of the university and its great benefactor, the major portion of his estate being left to the Purdue Research Foundation.

The retirement on July 1 is noted of William Aitkenhead, head of the department of agricultural engineering since 1914, and of Dr. R. H. Carr, professor of agricultural chemistry, the latter after 30 years of teaching service. S. A. Anderson, associate in agricultural engineering, has resigned to become general manager of State-wide organizations of the Rural Electrification Membership Corporation. C. H. Reed, assistant professor of agricultural engineering, has been granted a year's leave of absence to work with the Douglas Fir Plywood Association at Tacoma, Wash., on problems connected with utilization of plywood in war activities.

Kansas College and Station.—George A. Dean, head of the department of entomology and entomologist of the station since 1913, retired as head of the department on July 1 and was succeeded in this capacity by Dr. Roger C. Smith, professor of entomology since 1926. Prof. Dean's services as entomologist, however, will be continued on a three-fourths-time basis with major attention to research.

Paul L. Dittemore, assistant professor of industrial journalism and station editor, has resigned to become production editor of the *Northwestern Miller*. Dr. Jehiel Davidson, associate chemist in the U. S. Department of Agriculture, has been transferred from Washington, D. C., to the laboratories of the station department of milling industry, where he will continue his research in cereal chemistry, giving special attention to the problems of the Hard Winter Wheat Regional Laboratory.

Kentucky Station.—The resignations are noted of Kenneth Anderson, field agent in cream grading; William B. Cherry, assistant bacteriologist in animal pathology; David MacFarlane and Max Tharp, assistants in farm economics; and W. C. Stammer, spectroscopist in chemistry. Recent appointments include Drs. E. R. Doll and Leonard M. Josephson as assistant animal pathologist and assistant agronomist, respectively.

Cornell University and New York State Station.—Dr. A. C. Dahlberg, head of the dairy division of the State station, has been transferred as of July 1 to the College of Agriculture at Ithaca, where he will carry on studies of problems related to the manufacture of dairy products.

Recent appointments include Drs. Elmer H. Stotz as professor of agricultural chemistry and biochemistry and head of the division of chemistry at the State station, effective August 1, and J. A. Adams as assistant professor of entomology, with headquarters for the present at the Hudson Valley Fruit Investigations Laboratory at Poughkeepsie, where he will carry on studies on the biological control of the Japanese beetle.

Oklahoma College and Station.—The resignation is noted of C. A. Roberts, assistant professor and assistant in poultry husbandry. Recent appointments include Charles H. Brett as assistant entomologist and Rollin H. Thayer as assistant poultry husbandman.

Tennessee Station.—Under appropriations by the 1943 legislature additional substations have been established in Cumberland and Robertson Counties, the former to serve the Cumberland Plateau and the latter the Highland Rim region of middle Tennessee. This increases the number of experimental units in the State from five to seven and has led to the provision of an assistant station director. Frank S. Chance, superintendent of the Tobacco Substation at Greeneville, has been appointed to this position.

Wisconsin University.—Dr. Abby L. Marlatt, director of home economics of the university from 1909 till her retirement in 1939, died June 23, aged 74 years. A native of Manhattan, Kans., and a graduate of the Kansas College in 1888, she received the M. S. degree from the same institution in 1890 and was head of the department of domestic economy in the Utah College from 1890 to 1894. She was widely known for her pioneer work in home economics and especially for her success in its development in Wisconsin. In recognition of her activities she was given the D. Sc. degree by the Kansas College in 1925.

Wyoming University and Station.—Dr. Lloyd H. Scrivner, assistant professor of veterinary science and bacteriology, has resigned to go into commercial work, and has been succeeded by Dr. J. F. Ryff. Robert E. Pfadt has been appointed as assistant research apiculturist vice C. Harold Gilbert, resigned. Alexander Johnston, assistant wool specialist, has been granted 4 months' leave of absence for special studies in wool shrinkage determination for the U. S. Department of Agriculture under the Government wool purchase plan. Dr. Roice H. Anderson has been appointed assistant professor and research assistant in agricultural economics, and Lael R. Harrison, field assistant in seed certification and research assistant in the station.

Tropical Plant Research Foundation.—Largely because of the establishment of other organizations now carrying forward its avowed objects, decision has been reached to dissolve this foundation. Its assets are to be divided, the Inter-American Institute of Agricultural Sciences of Turrialba, Costa Rica, receiving the Tropical Agricultural Library and the Boyce Thompson Institute the office equipment. The residual cash and bonds, expected to net about $4,500, are to be given the Division of Biology and Agriculture of the National Research Council for use in the promotion of tropical agriculture.

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EXPERIMENT STATION RECORD

VOL. 89 OCTOBER 1943 No. 4

RECENT WORK IN AGRICULTURAL SCIENCE[1]

AGRICULTURAL AND BIOLOGICAL CHEMISTRY AND MICROTECHNIC

A study of some chemical and physical properties of the clay minerals nontronite, attapulgite, and saponite, O. G. CALDWELL and C. E. MARSHALL (*Missouri Sta. Res. Bul. 354 (1942), pp. 51, illus. 13*).—This bulletin is in three parts, of which the first contains a review and deals further with general physical properties, dispersion and mechanical analysis, and electrodialysis; part 2 takes up chemical analyses, calculation of lattice type and lattice replacements, and titration curves; while part 3 is concerned with dehydration studies, density determinations, stability and coagulation, and optical studies, including refractive indices of suspensions and of flakes, the effect of heat treatment upon refractive indices, and birefringence and the Wiener theory. A bibliography of more than 70 references is appended.

Pyrolysis of lactic acid derivatives: Conversion of methyl α-acetoxypropionate to methyl acrylate, L. T. SMITH, C. H. FISHER, W. P. RATCHFORD, and M. L. FEIN. (U. S. D. A.). (*Indus. and Engin. Chem., 34 (1942), No. 4, pp. 473–479, illus. 3*).—Some economic and technological aspects of conversion of carbohydrates, particularly lactose in whey, into acrylate resins through lactic acid and acrylic esters as intermediates are briefly discussed. The pyrolysis of an inexpensive and readily available lactic acid derivative, methyl α-acetoxypropionate, was studied, and the effect of temperature, contact time, and various contact materials was determined. Conditions were found under which pyrolysis products, methyl acrylate and acetic acid, can be produced with low contact times (high throughput). At temperatures above approximately 550° C. it is possible to convert nearly all of the methyl acetoxypropionate into methyl acrylate and acetic acid in one pass. Several satisfactory contact materials were found, and the desirability of high surface and free space was demonstrated.

Extraction, separation, and concentration of some anterior pituitary hormones, A. J. BERGMAN and C. W. TURNER (*Missouri Sta. Res. Bul. 356 (1942), pp. 76, illus. 1*).—The method of assay used for lactogen, thyrotropin, gonadotropin, blood sugar-raising factor, mammogenic duct, and lobule-alveolar growth factors are described, together with a method for assaying the adrenotropic hormone on 1-day-old chicks. A unit of adrenotropic hormone is defined as the total amount of extract administered over a 4-day period with subcutaneous injections once each day which will cause a mean weight increase of 25 percent in the adrenals of 20 chicks weighing 50±10 gm.

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[1] The publications abstracted in these columns are seldom available for distribution by the Office of Experiment Stations. In general, application should be made to the Office of Information of the U. S. Department of Agriculture, Washington, D. C., for publications of the Department; to the directors of the State agricultural experiment stations, as listed on page 3 of the cover of this issue, for publications of the several experiment stations; and to publishers of books and journals for material issued by them. Microfilms and photostatic copies, the latter legible without magnifying equipment, may be purchased from the Library, U. S. Department of Agriculture, Washington, D. C. Rates and other details are explained in a previous issue (E. S. R., 87, p. 324).

Storage of the fresh gland tissue at from −10° to −15° C. and of the acetone dried tissue at from 15° to 20° in sealed bottles preserved the activity of both for 1 yr. or longer. Methods used for the extraction, separation, and concentration of the various hormone fractions are described in working detail.

The synthesis of an isomer of estrone containing a phenolic B ring, W. E. Bachman and A. B. Ness (*Jour. Amer. Chem. Soc., 64 (1942), No. 3, pp. 536–540*).—5,6,7,8-Tetrahydro-1-methoxynaphthalene was shown to react with succinic anhydride in the 4-position. The keto acid was reduced by the Clemmensen method, and the reduced acid was cyclized to 1-keto-9-methoxy-*s*-octahydrophenanthrene. From the latter compound 6-hydroxy-1,2,3,4-tetrahydro-17-equilenone was synthesized.

The total synthesis of a stereoisomer of the sex hormone estrone, W. E. Bachman, S. Kushner, and A. C. Stevenson (*Jour. Amer. Chem. Soc., 64 (1942), No. 4, pp. 974–981, illus. 1*).—The synthesis of a mixture of stereoisomers possessing the structure of estrone is described. From the mixture the racemic form of one of the stereoisomers of estrone was isolated in crystalline form. The estrogenic activities of the products are reported. Of the isolated crystalline compound, 250γ had an activity the same as that of 1γ of estrone. Of the mixture of stereoisomers, 50γ showed the physiological effect of 1γ of the natural isomer.

The composition of summer range plants in Utah, L. A. Stoddart and J. E. Greaves (*Utah Sta. Bul. 305 (1942), pp. 22, illus. 9*).—Between 1934 and 1937 forage plants were collected at monthly intervals from mountainous summer ranges near Logan and analyzed for total ash, crude protein, crude fat, crude fiber, nitrogen-free extract, phosphorus, calcium, magnesium, and sulfur. Only those parts of the plant actually being consumed by grazing animals were analyzed.

The levels and seasonal trends in each constituent were studied for 24 major forage species throughout the grazing season, major differences in species and forage class being found. In all plants general decreases in protein and sulfur were found as the season progressed, whereas fiber, nitrogen-free extract, fat, and, except in the case of grasses, calcium increased. Grasses were always low in protein, fat, calcium, phosphorus, magnesium, sulfur, and calcium-phosphorus ratio compared to other forage groups, and were at all seasons highest in fiber. Without exception, grasses appeared to decrease in mineral content in the fall, showing great seasonal fluctuation. Browse plants were high in fat and nitrogen-free extract and low in fiber compared to other groups. Browse appeared to be less subject to leaching and did not show seasonal fluctuation as great as did other plants. Forbs were outstandingly high in protein and ash and, in general, showed a seasonal fluctuation intermediate between that of the grasses and that of shrubs. The weighted average composition of the flora available to grazing animals indicated a satisfactory feed, especially in the early season, with the possible exception of the calcium-phosphorus ratio. This ratio, averaging 4.15:1, was found considerably above usual standards and under certain conditions might interfere with normal nutrition, especially in the fall. These analyses did not indicate the advisability of supplementing this type of range.

Sulfur in forages, E. P. Painter (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 5, pp. 20–22*).—Sulfur determinations were made on samples of forage feeds from farms where pregnancy disease in ewes was prevalent. The organic sulfur content (total sulfur—sulfate sulfur) of the grasses and oat straw was very low. It seemed doubtful if farm animals could obtain sufficient of the sulfur containing amino acids when fed diets of forages of this low sulfur content. Samples of sweetclover, bromegrass, and crested wheatgrass, taken from a grazed pasture at different dates during the summer as grown at Fargo in 1939, were also analyzed. Sulfur tends to decrease late in the season.

The enrichment of corn meal and grits, E. J. Lease (*South Carolina Sta. Cir. 64 (1943), pp. 11, illus. 1*).—The enrichment of degerminated corn meal, now required as to thiamin, niacin, and iron by State law, is usually accomplished by a mixing process the same as that used in enriching white flour. Since grits are washed before cooking, it is necessary to use a special granular premix to enrich them. The enriching ingredients are not lost from this premix in washing because they are enveloped in gelatinized starchy particles. The total cost of enrichment is about 15 ct. per 100 lb. of grits, about 10 ct. per 100 lb. of degerminated corn meal, and 5 ct. or less per 100 lb. of whole-corn meal.

Bean sprouts: Their preparation and properties, H. C. Beeskow (*Michigan Sta. Tech. Bul. 184 (1943), pp 31, illus. 6*).—Sprouts were prepared in small tanks in which the air and moisture conditions were controlled. Results of these tests show that the best sprouts are produced where a mixture of 10 percent carbon dioxide, 10 percent oxygen, and 80 percent nitrogen was circulated through the bean sprout mass. Rapid air circulation or a high percentage of oxygen in the gas mixture produced sprouts which were stringy and slender. In contrast, too slow air circulation, a low oxygen, or a high carbon dioxide concentration in the gas mixture caused sprouts to form which were short and stubby.

On a small scale satisfactory sprouts can be produced if the beans are allowed to soak at room temperature for 8 hr., washed, and transferred to wooden pails or crocks with perforated bottoms to allow for drainage. The sprouts should be thoroughly sprinkled every 4 hr. with water at room temperature. Under these conditions satisfactory sprouts are obtained in about 5 days.

[Apple sirup] (*Massachusetts Sta. Bul. 398 (1943), p. 46*).—It is noted briefly that a sweet, pleasant tasting sirup can be made at home by partially neutralizing the acid in fresh apple cider with baking soda and concentrating approximately seven to one. "Many New England farms having cull apples, a cider press, and a maple sugar evaporator are in a position to make large quantities of this sirup."

Determination of pyrophosphate by precipitation with cadmium and polarographic measurement of cadmium in the precipitate, G. Cohn and I. M. Kolthoff. (Univ. Minn.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 886–890*).—The authors have devised a method for the quantitative precipitation of pyrophosphate as cadmium pyrophosphate. After filtering and washing, the precipitate can be weighed in the anhydrous form when dried to constant weight at 250° C. In general, it is simpler and more practical to dissolve the precipitate in dilute hydrochloric acid and determine the cadmium polarographically. A procedure for the determination of from 0.002 to 0.01 M pyrophosphate solutions in the presence of from 4 to 16 times the molar concentrations of o-phosphate and from 8 to 32 times the molar concentration of calcium is detailed.

Potentiometric titration of dibasic acid in dioxane-water mixtures, R. H. Gale and C. C. Lynch. (Univ. Del.). (*Jour. Amer. Chem. Soc., 64 (1942), No. 5, pp. 1153–1157, illus. 3*).—The authors here extend the theory of acid-base titration in dioxane-water mixtures for weak monobasic acids to include the titration of weak dibasic acids in dioxane-water mixtures. Titration data on oxalic, malonic, succinic, and glutaric acids support the theory.

Determination of amino acids in plasma by the ninhydrin-carbon dioxide reaction without removal of proteins, D. A. MacFadyen (*Jour. Biol. Chem.*, *145 (1942), No. 2, pp. 387–403, illus. 3*).—The gasometric determination of amino acids by their specific reaction with ninhydrin to evolve CO_2, described by Van Slyke, Dillon, MacFadyen, and Hamilton (E. S. R., 88, p. 588), has been applied to blood plasma under conditions which avoid the necessity of removing the proteins or the urea. These substances evolve small quantities of CO_2, but accurate corrections for them can be made.

A Lactobacillus assay method for p-aminobenzoic acid, J. C. Lewis. (U. S. D. A.). (*Jour. Biol. Chem.*, *146 (1942), No. 2, pp. 441–450, illus. 1*).—A rapid and accurate microbiological assay method for *p*-aminobenzoic acid is based on the growth factor activity of *p*-aminobenzoic acid for *L. arabinosus* 17–5. The assay range is from 0.15 to 0.5 mμg. of *p*-aminobenzoic acid. Assay values for a number of biological materials are included. The occurrence of biologically inactive combinations of *p*-aminobenzoic acid was indicated. These were activated by alkaline hydrolysis.

A tilting arc flow divider suitable for reflux ratio control, S. Palkin and S. A. Hall. (U. S. D. A.). (*Indus. and Engin. Chem., Analyt. Ed.*, *14 (1942), No. 11, pp. 901–902, illus. 1*).—The reflux divider described is of the continuously dividing type, has the advantage that ratio control is reasonably independent of rate, is not subject to difficulties arising through contact of distillate with lubricant, has a negligible hold-up, and is relatively simple in construction.

Pyrex brand glass wool as a filtering medium, G. B. Heisig. (Univ. Minn.). (*Indus. and Engin. Chem., Analyt. Ed.*, *14 (1942), No. 9, p. 766*).—An investigation showed that a solution of a strong base or acid, used to extract the glass wool named, gives a precipitate of aluminum hydroxide when neutralized and treated with a slight excess of ammonia. The presence of aluminum in the precipitate was confirmed by the aluminon test. Excellent tests for aluminum were obtained when approximately 0.1 gm. of the glass wool was extracted with 1 cc. of 0.1 N hydrochloric acid. After the glass wool had been extracted several times with dilute hydrochloric acid and thoroughly washed, additional acid used to extract the glass wool gave no precipitate of the aluminum lake of aluminon, but a comparison of the solution with a blank showed that a small amount of aluminum ion was present. For all except the most exacting uses, this glass wool will be satisfactory after it has been thoroughly extracted with a hot acid and washed.

Gas-fired furnace for semimicrodetermination of carbon and hydrogen, H. A. Pagel. (Univ. Nebr.). (*Indus. and Engin. Chem., Analyt. Ed.*, *14 (1942), No. 9, pp. 764–766, illus. 2*).—The gas-fired furnace described is fitted with silver "sleeves" which serve as very efficient heat conductors to provide a practically uniform cross section and linear combustion tube temperature. The design also includes a center combustion tube support which in no way interferes with the burning of the carbon residue. The sample is protected against premature vaporization or decomposition from radiant heat.

Polyvinyl alcohol: A medium for mounting and clearing biological specimens, W. G. Downs (*Science*, *97 (1943), No. 2528, pp. 539–540*).—The stock solution is prepared by adding polyvinyl alcohol (PVA) powder slowly to cold water with thorough stirring. The original medium clears certain types of material satisfactorily but remains liquid and has to be sealed. A somewhat similar preparation (PVA stock solution 56 percent, phenol 22, and lactic acid 22 percent, by volume) was found to clear small objects removed directly from aqueous solution and within 2 days to cement the cover glass firmly in place. The technic described has proved useful for such diverse objects as pollen grains and mosquito larvae.

AGRICULTURAL METEOROLOGY

Climatology: General and regional, T. A. Blair (*New York: Prentice-Hall, 1942, pp. 484+, illus. 102*).—This text presents a short and simple restatement of the principles of climatology and a concise summary of the main features of the major climatic regions of the world. It is intended as an introduction to the study of climate for those who will go on to more detailed studies and as a survey course for those whose primary interests are elsewhere.

Problems in the classification of climates, C. W. Thornthwaite (*Geog. Rev., 33 (1943), No. 2, pp. 233–255*).—Climatic types are said to be to climate what air-mass types are to weather. There is thus a close parallelism between modern efforts at classification of climates and recent work of meteorologists on the classification of air masses. Progress in the classification of climates from the earlier literature to that of 1942, with data drawn copiously from the works of W. Köppen, is reviewed and critically analyzed (bibliographic footnotes). If it were not for the fact that vegetation and soils integrate the various climatic elements, the complexity of climate would raise almost insuperable obstacles to the development of a rational classification. The result of such an integration is considered to be a classification of climate, not one of vegetation climatically explained, as has sometimes been asserted. Geographers have concerned themselves with climate because they have believed that there are, on the earth's surface, natural climatic regions that are reasonably homogeneous and that have boundaries which can be identified in terms of limits of plant communities, soil groups, and land-form types, and can be defined in terms of numerical climatic data. "The value of any climatic classification depends, first, on the accuracy with which the climatic regions are identified and their boundaries located, and second, on the skill with which numerical data are selected to match these boundaries. A climatic scheme can be evaluated by these two tests and by them alone."

An introduction to the study of weather and climate, H. B. Ward and W. E. Powers (*Evanston, Ill.: Northwest. Univ., 1942, pp. 112, illus. 25*).

Ways of the weather: A cultural survey of meteorology, W. J. Humphreys (*Lancaster, Pa.: Jaques Cattell Press, [1942], pp. 400+, illus. 75*).

March temperature lowest of record at State College, R. Woodburn (*Miss. Farm Res. [Mississippi Sta.], 6 (1943), No. 4, p. 8*).—The minima of 14° and 15° F. for March 3 and 4, 1943, respectively, were the lowest in the period of record (1910–43). Comparisons of winter temperatures for the 33 yr. are tabulated and discussed.

Weather station (*New Mexico Sta. Rpt. 1942, pp. 35–37, illus. 3*).—Precipitation by months for 1941, the wettest year on record at the station, with a total of 19.6 in. of which 7.53 in. fell in September, is tabulated and discussed, with other brief notes.

Stream flow records of Pennsylvania, 1941 (*Pa. Dept. Forests and Waters. Stream Flow Recs., 1941, pp. 201+*).—This report (E. S. R., 86, p. 739) presents records for the year ended September 30, 1941, on stream gaging, precipitation, ground water, and stream flow for the State.

SOILS—FERTILIZERS

Vertical zonation of great soil groups on Mt. Graham, Arizona, as correlated with climate, vegetation, and profile characteristics, W. P. Martin and J. E. Fletcher. (Coop. U. S. D. A.). (*Arizona Sta. Tech. Bul. 99 (1943), pp. 87–153, illus. 10*).—This study consisted of a description of representatives of the great soil groups of the United States which were found in vertical zones on

Mount Graham and vicinity, in southern Arizona. Vegetation and climatic changes were correlated with the different soil types examined. Profile samples were submitted to a physical, chemical, and microbiological analysis. The current importance of such studies is emphasized, since "a knowledge of the physical, chemical, and microbiological characteristics of the soil profile as related to soil-forming processes is fundamental to any ecological, land use, or fertilizer study relating to the growth of plants. . . . This type of study becomes increasingly important in wartime when land use for increased production of food and fiber is intensified and dangers of permanent injury through poor use must be guarded against."

Thornthwaite's P-E (precipitation effectiveness) and T-E (temperature efficiency) indices were calculated from rainfall and temperature averages for the different vegetation zones. "On the basis of climatic types thus deduced, the soils on Mount Graham and vicinity conform satisfactorily to the great soil groups of the United States."

Chemical characteristics of the great soil groups of China, C.-K. Lee (*Soil Sci., 55 (1943), No. 5, pp. 343–349, illus. 1*).—The present report, which gives the chemical characteristics of the great soil groups, is an abstract from the previous analytical works. A generalized soil map is included.

Some solodized soils of the Red River Valley, C. O. Rost and K. A. Maehl. (Minn. Expt. Sta.). (*Soil Sci., 55 (1943), No. 4, pp. 301–312*).—On the basis of their morphological and chemical characteristics, 17 profiles of intrazonal soils from the Minnesota portion of the Red River Valley were divided into three groups. In group I, soluble salts are present in the B horizon; the A horizon is acid, but the B shows little or no acidity; exchangeable hydrogen is confined almost exclusively to the A horizon with a higher proportion in the A_2 than in the A_1; the exchangeable magnesium exceeds the exchangeable calcium in the B horizon; and soluble silica in all horizons is lower than that in corresponding horizons of groups II and III. In group II, the solum is leached of soluble salts; the acid reaction extends well into the B horizon, although the latter is usually only mildly acid, and the acidity decreases with depth in the profile; exchangeable hydrogen usually is found in all parts of the solum and always is highest in the A horizon; exchangeable calcium in the B horizon is distinctly higher and exchangeable magnesium markedly lower than in the profiles of group I; and soluble silica in the A horizon is very high, and the quantity in the A_1 is greater than that in the A_2. In group III, the profile is free of soluble salts; the A_1 horizon is only mildly acid; the B_1 and B_2 horizons are more acid than any others in the profile; exchangeable hydrogen is lower in the A horizon than in the same horizon in groups I and II, and as percentage of total cations it is considerably lower in the A_1 than in the A_2; exchangeable calcium expressed as percentage of total cations is distinctly higher in the A_1 horizon than in the A_1 of groups I and II; and soluble silica in the A_1 horizon is about the same as that in the A_2, and quantities in the latter are usually higher than in the same horizon of members of groups I and II.

It is suggested that the profiles of groups I, II, and III represent a progressive increase in the solodization process, despite the absence of a destructive cation such as sodium. There was some evidence that calcium is being returned to the surface in the profiles of group III.

Some factors influencing aggregation of claypan soils, F. G. Ackerman and H. E. Myers. (U. S. D. A. and Kans. Expt. Sta.). (*Soil Sci., 55 (1943), No. 5, pp. 405–413*).—The authors determined degree of aggregation, the percentage of nitrogen and organic carbon, and the lime requirement of the soils of both cultivated and grass plats on two clay pan soils of southeastern Kansas.

Differences in degree of aggregation, apparently due to the influence of the kind of crops grown, proved, by statistical analysis, to be highly significant. An application of 8 tons per acre of manure had little effect on aggregation 6 mo. after application. Manure, lime, and superphosphate as soil treatments and the growing of legumes in the rotation had no measurable carry-over effect on aggregation through succeeding periods of nonlegume cropping. Where a tame grass mixture and alfalfa alone were grown undisturbed for 3 yr., the alfalfa had the more favorable effect on aggregation. In these experiments the possible effect of organic carbon, nitrogen, carbon: nitrogen ratio, or lime requirement on soil aggregation was overshadowed by the influence of different crops grown. Lime, as a direct factor in aggregation, was found relatively unimportant. On grass plats aggregation was positively associated with the organic carbon content of the soil. In the cultivated plats the differences due to crop far outweighed differences due to organic carbon. These results indicate that, although wider carbon: nitrogen ratio is associated with improved aggregation where the soil and crop are fairly constant, the relation of carbon to nitrogen is not so important in the formation of soil aggregates as the total amount of the organic carbon.

The relation of clay and organic matter to soil moisture equilibrium points, W. L. Hutcheon (*Sci. Agr., 23* (*1942*), *No. 1, pp. 4–16, illus. 5*).—Data are presented for 36 Saskatchewan soil types on hygroscopic coefficient, wilting coefficient, and moisture equivalent. Soil composition was considered in relation to the above factors. Clay content and organic matter were found to have a marked influence on the results obtained.

Formation of water-stable structure in puddled soils, J. B. Peterson. (Iowa Expt. Sta.). (*Soil Sci., 55* (*1943*), *No. 4, pp. 289–300, illus. 1*).—Development of aggregation was tested in samples of soil from the B horizon of Tama silt loam mixed with ground alfalfa, ground cornstalks, and sucrose at rates of 5 and 50 tons per acre, incubated for a month, puddled, and exposed to wetting and drying. Except when the soils were incubated under aseptic conditions, ground alfalfa and cornstalks resulted in less aggregation, in general, than that which developed in the untreated soil. At the 50-ton rate, cornstalks produced less aggregation than alfalfa. At the 50-ton rate sucrose produced more aggregates larger than 1 mm. than occurred in any of the other treated or untreated soils, but in most instances it resulted in fewer aggregates smaller than 1 mm. The aggregates in the sucrose-treated samples were angular and blocky and were composed of a dense, compact ground mass, whereas the aggregates in all other samples were granular and were composed, in turn, of all grades of smaller sized granules. The structural units in the sucrose samples were wetted with difficulty and did not exhibit much swelling, whereas the structural units in all the other samples absorbed water readily and exhibited marked swelling.

Soil solution concentrations at the wilting point and their correlation with plant growth, O. C. Magistad and R. F. Reitemeier. (U. S. D. A. et al.). (*Soil Sci., 55* (*1943*), *No. 5, pp. 351–360, illus. 1*).—Samples of 17 soils representing a wide range of salinity conditions were collected and notes on plant growth were made. Soil solutions of these soils were obtained at moisture contents within normal field range. These solutions were analyzed and the values extrapolated to the 15-atmosphere (wilting percentage) value. Concentrations of salt are given in osmotic units, conductivity units, parts per million, and milliequivalents per liter. The relationship between plant growth and osmotic pressure of soil solution was similar to that obtained in sand culture and solution culture experiments and was of the same order. Above 40 atm. concentration the soils were barren. Normally fertile irrigated soils had a soil solution concentration at wilting percentage of from 1.3 to 1.8 atm., conductance values ($K\times10^5$) of 200 to 350, 2,000 to 4,000 p. p. m. and 30 to 50 m. e. per liter of salts. The soil solutions as extracted varied greatly in composition.

Nitrates formed half the anions in the solutions from fertile soils. In a few solutions the magnesium content exceeded that of calcium.

The suitability of water purified by synthetic ion-exchange resins for the growing of plants in controlled nutrient cultures, G. F. Liebig, Jr., A. P. Vanselow, and H. D. Chapman. (Calif. Citrus Expt. Sta.). (*Soil Sci., 55 (1943), No. 5, pp. 371–376, illus. 1*).—The results of experiments to determine the suitability, for plant growth, of water purified by passage through synthetic ion-exchange resins show that water of high quality can be obtained. Objectionable traces of copper and other heavy metals can be removed from distilled water by passage through a hydrogen-saturated cation-exchange resin. The purity of the water is increased by repeated passages through this resin. Water comparable in quality to distilled water, except for silica content, can be prepared from ordinary tap water by passage through both cation- and anion-exchange resins. This water was found to be suitable for use in plant nutritional studies. The cost of purifying the local tap water with equipment having a capacity of 300 gal. an hour is estimated, not considering the original investment, at somewhat less than 0.1 ct. per gallon.

The activity of subsurface soil populations, A. S Newman and A G. Norman. (Iowa Expt. Sta.). (*Soil Sci., 55 (1943), No. 5, pp. 377–391. illus 2*).—Subsurface soil samples were found to contain microbiological populations smaller, less versatile, and less adaptable than surface soil populations. Introduced plant material was decomposed less rapidly and less extensively. The introduction of surface soil populations by addition of inocula of soil or of soil suspension was not followed by the increase in activity that would be expected. The same inocula in sand accomplished rapid decomposition of plant material. Evidence supporting the view that antibiotic or inhibtory substances are responsible for this effect is given, and it is suggested that these substances are of microbial origin. Aqueous extracts of soil do not adversely affect the growth of soil bacteria in vitro, but alcohol extracts did, in some instances, reduce the activity of the organisms in soil, the development of bacteria in liquid culture or on plates, and the rate of growth of fungi on plates. It is believed that because the nutritional conditions vary little, and because of the presence of inhibitory agents, subsurface populations tend to stabilize themselves and to resist displacement or colonization by other introduced forms.

The effect of surface mulches on water conservation and forage production in some semidesert grassland soils, E. L Beutner and D. Anderson. (U. S. D. A. coop. Ariz. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 5, pp. 393–400, illus. 4*).—Various types of vegetal material were used as surface mulches and incorporated into the soil to determine the effect on infiltration and erosion by means of artificial rainfall applied on small plats on two soil types located near Tucson, Ariz. Protection of the soil surface either by plants themselves or by organic litter which they furnish was found to prevent sealing of the soil and to be important in promoting infiltration of water into the soil, and to conserve moisture for plant growth. The authors suggest that a 20-percent increase in conservation of moisture in well-vegetated areas may increase forage production by 50 percent.

Relation of wind erosion to the water-stable and dry clod structure of soil, W. S. Chepil (*Soil Sci., 55 (1943), No. 4, pp. 275–287, illus. 1*).—The author found a close relation between wind erosiveness and the water-stable and dry-clod structure of various soils. The computed erosiveness, based on the dry-sieving analysis of the soil, varied approximately with the actual erosiveness determined by wind tunnel tests. It was concluded that the dry-clod structure, as determined by dry-sieving, can be used as an approximate index of wind erosiveness both of less recently cultivated soils that have formed a surface crust following a rain and of freshly cultivated soils. An increase in the quantity of coarse water-stable aggregates ($>$0.42 mm.) increased the cloddiness and decreased the erosiveness of the soil. An increase in the quantity of fine water-stable particles ($<$0.02 mm.) produced the same effects. Many soils of a similar water-stable aggregate structure varied appreciably in cloddiness and erosiveness, suggesting that factors other than the water-stable aggregate structure influence these properties.

Erosion lowers wartime production on northeastern farms, W. W. Reitz (*U. S. Dept. Agr., Misc. Pub. 516 (1943), pp. 16+, illus. 35*).—As examples of the need for some erosion control measures even in the Northeastern States, it is noted that contouring of potatoes in Maine produced an increase of 50 bbl. per acre, or 37 percent; that a farmer's first experiment with strip cropping of corn in New York State produced "one-third more corn silage on 2 acres less land"; that conservation measures on soil plats in New Jersey yielded 35 percent more sweet corn and reduced soil loss from 2,400 to 54 lb. per acre; and that in West Virginia a 30-percent increase in tomato yields was attained by strip cropping. Numerous illustrations furnish further evidence of like import. Conservational and remedial measures to meet a variety of conditions encountered in the northeastern area are briefly indicated.

The effect of slope on soil erosion, H. H. Krusekopf (*Missouri Sta. Res. Bul. 363 (1943), pp. 24, illus. 15*).—Runoff was found to decrease with length of slope and increase with steepness of slope, although the results indicate that under a good cropping system, length of slope is relatively unimportant. Land in continuous corn had approximately 50 percent greater runoff than land in a rotation. Runoff losses were greatest in the months of June, May, and September. These are also the months of highest rainfall. Erosion losses were similar to those obtained elsewhere when considering the effect of slope, i. e., erosion increased with increase in length and degree of slope. With continuous corn, losses ranged from 43 tons per acre on slopes of about 60 ft. in length to 72 tons for plats about 150 ft. long. If long slopes are frequently used for cultivated crops, such as corn, then shortening the slopes by means of terraces or other devices becomes increasingly important. Under continuous corn an increase of 30 ft. in slope length resulted in an increased soil loss of about 14 tons per acre. The results of this investigation indicate that cover, or the cropping system, is the most important factor affecting runoff and erosion, and regardless of the degree or length of slope, and the time or intensity of the rain, soil and water losses were lowest whenever the ground was covered with vegetation. Detailed data on the effect of various factors on runoff and erosion are presented in an appendix.

Sanborn Field: Fifty years of field experiments with crop rotations, manure, and fertilizers, G. E. Smith (*Missouri Sta. Bul. 458 (1942), pp. 61, illus. 11*).—Results of 50 yr. of field plat work with different soil treatments and management practices point the way to systems of soil management that are effective in restoring soil fertility and sustaining a permanent agriculture.

The value of rotations, whether long or short, over continuous culture are reflected with higher yields and greater net returns. While short rotations generally resulted in the larger economic returns, the longer rotations were found to be more effective in maintaining soil productivity. Crop rotations without manure have been as effective in maintaining the yields of corn, wheat, and oats as have heavy applications of manure when these crops were grown continuously without rotation. Farm manure has been effective in maintaining a higher content of N in the soil. The author points out that when only a limited amount of manure is available for spreading, greater total returns will be obtained from spreading at the rate of from 3 to 5 tons per acre than at 8–10 tons per acre on a smaller area. On soils having insufficient Ca, limestone was found to be essential for the growth of clover. Applications of commercial fertilizer have maintained crop yields, but the nutrients applied have not been efficiently recovered by the crops. Commercial fertilizer treatments without the use of crop residues have resulted in a serious depletion of soil N. The author concludes that crop rotation alone, without the necessary nutrient additions from manures, lime, and commercial fertilizers to supply a balanced nutrient medium for plants, cannot indefinitely maintain profitable yields of high quality crops. An appendix presents a tabular summary of data accumulated since 1888.

Cropping systems and soil fertility, G. E. Smith (*Missouri Sta. Cir. 247* (*1942*), *pp. 15, illus. 11*).—This is a brief discussion of some of the more important practical conclusions drawn from Bulletin 458, above noted.

Soil management practices on Delta buckshot soils, J. Pitner (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 5, p. 7*).—Winter legumes made this soil more productive for cotton than did sorghum. The further addition for the cotton of 30 lb. of nitrogen as sodium nitrate gave the best yields. Experimental results emphasized the importance of fallowing buckshot soils. Yield data from various experiments on buckshot land are tabulated.

Soil fertility control for greenhouses, C. H. Spurway (*Michigan Sta. Spec. Bul. 325* (*1943*), *pp. 67, illus. 10*).—This bulletin, supplementing the station's Technical Bulletin 132 (E. S. R., 69, p. 328) in which the soil testing methods are described, discusses the use of soil tests as a guide for soil fertility maintenance under greenhouse conditions. The bulletin is in two parts, of which the first notes briefly in its introduction the object and advantages of soil testing in greenhouses. The two remaining sections of part 1 deal, respectively, with theoretical and practical basis for soil testing, and normal nutritive range, deficient range, and excess range of plant nutrients in greenhouse soils. Part 2 takes up objectives, soil treatments, and general considerations regarding soil fertility control in greenhouses; miscellaneous soil substances; soil conditions; water and water conditioning; plant symptoms of soil conditions; and soil treatments.

Effect of soil and soil treatment on stability of crop production, L. B. Miller and F. C. Bauer. (Ill. Expt. Sta.). *Jour. Amer. Soc. Agron.*, *35* (*1943*), *No. 6, pp. 475–481, illus. 2*).—The effects of soil management practices on annual variations in yields obtained from rotations are considered. Previous reports have been given for annual variations in the yield of wheat (E. S. R., 78, p. 479) and corn (E. S. R., 80, p. 186). Fertile soils, under Illinois conditions, produce high average yields of rotated crops with relatively few failures. Production is irregular on untreated land having low yielding ability, but on most soils it can be greatly increased and stabilized by appropriate soil treatment. Stability of production on sandy land is not greatly enhanced by soil treatment.

Maintain soil fertility by a planned fertilization program, E. R. Collins and W. E. Colwell (*Res. and Farming* [*North Carolina Sta.*], *1* (*1943*), *Prog. Rpt. 2, pp. 10, 11*).—A fertilizer program based upon computed removal of the respective nutrients by successive crops of rotations is discussed. Applying 50 lb. of potassium chloride for cotton and 50 lb. for peanuts resulted in less cotton and about the same yield of peanuts as compared with applying all of the potassium salt on the cotton. Removals of nitrogen, phosphoric anhydride, and potassium calculated as the oxide by two rotations are tabulated.

Fertilizer recommendations for 1943, E. G. Schafer et al. (Coop. West. Wash. Expt. Sta.). (*Washington Sta. V Cir. 3* (*1943*), *pp. 23*).—A brief introductory statement notes grades of mixed fertilizers which may be used in Washington in 1943 and some fertilizer materials suitable for direct applications or home mixing, and discusses the use of boron as fertilizer, methods of fertilizer applications, and the fertilizer recommendations. The fertilizer recommendations are presented in the form of tables for vegetable crops in western Washington: small fruits; pastures, hay, and general field crops; vegetable crops, fruit crops, and field crops on irrigated soils in eastern Washington; and vegetable crops and small fruit crops on nonirrigated soils in eastern Washington.

Fertilizers tested on fertile Delta bayou-bank soil, R. KUYKENDALL (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 4*, *p. 2*).—General fertilizer experiment results, with tabulated yield data, are reported on.

Long-time tests of fertilizer for Brown loam area, E. B. FERRIS (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 5*, *p. 8*).—Fertilizer experiments of the usual type are reported. Tabulated yield data are given.

Fertility level of soil may influence fertilizer results, R. KUYKENDALL (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 4*, *p. 8*).—This is a very brief summary of a local fertilizer experiment.

Barnyard manure has high value for crops and pastures, J. S. MOORE (*Mississippi Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 5*, *p. 7*).—The station dairy department in a 10-yr. program, by the use of barnyard manure and other methods of conserving and increasing soil fertility, produced during the first 5 yr. an average of 323.6 lb. of lint cotton per acre and during the last 5 yr. an average of 429.4 lb. In the same period the yield of corn for the first 5 yr. was 26.1 bu. per acre, and for the last 5 yr. it was 43.1 bu.

Effect of soil moisture and rainfall on chemical transformations in Cyanamid granules, G. E. SMITH, P. H. HEINZE, and A. E. MURNEEK. (Mo. Expt. Sta.). (*Soil Sci.*, *55* (*1943*), *No. 4*, *pp. 313–320*, *illus. 3*).—Cyanamid granules applied broadcast to the surface of soil in periods of dry weather became coated with a white crust. When the granules were exposed to soil moisture but protected from precipitation, more than one-third of the nitrogen was changed to dicyandiamide or was lost to the air as ammonia in 8 days. Precipitation soon after the fertilizer application leached most of the nitrogen into the soil. It was found that the calcium hydroxide formed was all changed to calcium carbonate and much of the nitrogen to dicyandiamide in the outer white crust. These two compounds produced an insoluble coating which prevented the rapid removal of the nitrogen from the inside of the granule when rains did fall.

Granular Cyanamid should be broadcast during periods of rainy weather to obtain the best results. Where it must be applied under dry weather, it should be worked into the soil. Even in periods of high rainfall the results probably will be more satisfactory if it can be cultivated into the soil.

The trend of phosphate adsorption by inorganic colloids from certain Indiana soils, L. E. ALLISON. (Ill. Expt. Sta.). (*Soil Sci.*, *55* (*1943*), *No. 4*, *pp. 333–342*, *illus. 1*).—The author reports a study of the phosphate adsorption behavior of inorganic colloids from the B_2 horizon of Miami, Cincinnati, and Frederick silt loams. These podzolic soils represent stages from youthful to advanced maturity in the order in which they are mentioned. The colloids were isolated by sedimentation and were electrodialyzed to remove all mobile ions. Phosphate adsorption experiments were conducted by a technic especially designed for effective pH control. The results of this investigation may be summarized as follows:

The curves of phosphate adsorption for the Miami, Cincinnati, and Frederick colloids over the pH range 3.0 to 8.0 exhibited a first peak of adsorption at pH 3.0 to 3.5, but this is believed to have been due mainly to the hydrated forms of iron. A second adsorption peak occurred at approximately pH 6.0. The adsorption at this reaction is ascribed to aluminosilicate clay minerals, effecting an anion exchange. Between the two adsorption maxima at pH 3.0 and 6.0, respectively, a much lower adsorption occurs at pH 4.5, apparently due in part to each of the aforementioned agencies. Within the reaction range of most arable (podzolic) soils, pH 5.0 to 7.0, the "bentonitic" type of phosphate adsorption (fixation) by anion exchange is held to play an important role. Although most of the phosphate in soils is adsorbed by the two agencies mentioned, exchangeable calcium is indicated as an important factor in retaining appreciable quantities of phosphate in acid soils in probably the most available of all of its fixed forms, i. e., in the H_2PO_4-Ca-micelle linkage. Evidence of retention in this form over the pH range 4.0 to 6.0, or higher, and of the extent of this type of retention, is presented.

Potassium retention from annual additions of chloride, sulfate, and nitrate, as influenced by limestone and by dolomite, W. H. MacIntire, W. M. Shaw, B. Robinson, and J. B. Young. (Tenn. Expt. Sta.). (*Soil Sci., 55 (1943), No. 4, pp. 321–332, illus. 3*).—The retention of potassium to be expected from surface applications of K_2SO_4 to the Hartsells and Cumberland soils was found significantly less than for equivalent quantities of the chloride and the nitrate. Retentions by the alkaline Calhoun soil were virtually identical for the three salts and not affected appreciably by either limestone or dolomite. It appeared that a rapid build-up of K-complexes by heavy additions of potassic salts to these soils would not be either feasible or economic. Continued applications of potassic salts deplete the calcium and magnesium content of acidic soils. This depletion should be offset by adequate liming. Within the zone of their incorporation, however, incorporations of limestone and of dolomite tend to decrease the solubility of both native and additive potassium and thus affect the supply of nutritional potassium.

A comparison of the response of alfalfa to identical Ca-K ratios in soil and in sand cultures, A. S. Hunter. (N. J. Expt. Stas.). (*Soil Sci., 55 (1943), No. 5, pp. 361–369, illus. 2*).—Alfalfa was grown on soil and in sand culture for 83 and 77 days, respectively, with identical ratios of Ca to K available to the plants. Ca-K ratios of 1:1, 2:1, 4:1, 8:1, 16:1, and 32:1 were investigated. There was considerable similarity in the values obtained from the same ratios in the two media, particularly for the ratios 1:1, 2:1, 4:1, and 8:1. The highest yield from the soil was obtained with the highest Ca-K ratio, 32:1. The highest yields, both absolute and relative, from the sand culture were obtained from the first four ratios, the yields decreasing sharply at Ca-K ratios of 16:1 and 32:1. The low yields for the highest ratios in sand culture are attributed largely to an excessively low pH of the nutrient solution.

Quenched calcium silicate slag: A by-product substitute for limestone and superphosphate, W. H. MacIntire and S. H. Winterberg. (*Tennessee Sta. Bul. 184 (1943), pp. 32, illus. 11*).—The quenched silicate slag contains practically all of the elements native to the raw rock phosphate and about one-twentieth of its phosphorus content. Hence, substantial phosphate additions are made to the soil when the slag is incorporated at rates equivalent to those recommended for limestone. The slag was found an effective liming material. The rates recommended for the unground slag are from 2 to 5 tons per acre. It is stated that the response will be better if the slag be incorporated a month or more before the seeding. The slag is a good substitute for limestone and one moderate incorporation of superphosphate. The slag does not supply magnesium and is not a substitute for dolomite, the preferred type of limestone in those sections known to be deficient in and responsive to additions of magnesium. An undetermined point is whether repeated use of slag will serve to maintain an adequate phosphate content in the soil without ultimately inducing "overliming." Precautions necessitated by its content of calcium fluoride are noted.

Modern methods of soil testing, G. P. PERCIVAL. (Univ. N. H.). (*Jour. Chem. Ed., 19 (1942), No. 12, p. 604*).—The boron status of a soil was studied through the use of sunflowers planted in the soil to be tested, which was fed with a nutrient solution, and determining the time before boron deficiency symptoms appeared at the growing tip in comparison with plants growing in a check soil.

AGRICULTURAL BOTANY

De l'absolu nécessité d'une nomenclature internationale des bactéries [The absolute necessity of an international system of nomenclature for bacteria], P. HAUDUROY (*Chron. Bot., 7 (1943), No. 7, pp. 303–306*).—The author calls attention to the present chaotic condition of bacterial nomenclature and puts forth certain suggestions for bettering the situation. Bacterial nomenclature is considered in its two aspects, viz, the giving of precise names to bacteria and the technics and procedures for identifying them. It is deemed essential that the determination of a bacterium, and consequently of its name, be based on the use of technics described with the utmost precision, and that a bacterial nomenclature should be based on the study of freshly isolated organisms and on strains arising from single cells. The development of an international system should involve the establishment of definite rules of nomenclature, of bacterial names, and of grammatical usage; the setting up and defining of the orders, families, and genera; the development of an experimental plan permitting the exact classification of an organism; a revision of bacterial species and their names; and the formation of an international collection of bacteria. As an example of the present confused situation the author cites the case of the organism commonly called the "colon bacillus," which is referred to by different authors as *Bacterium coli commune, Bacillus escherichii, B. coli communis, B. coli, Bacterium coli, Bacillus coli verus, Aerobacter coli,* and *Esherichia coli.*

The internal structure of certain bacteria as revealed by the electron microscope—a contribution to the study of the bacterial nucleus, G. KNAYSI and S. MUDD. (Cornell Univ. et al.). (*Jour. Bact., 45 (1943), No. 4, pp. 349–359, illus. 20*).—The *Staphylococcus flavo-cyaneus* was found to contain one or more granules with solubilities similar to nucleoproteins and often appearing constricted or in pairs. In very young, actively growing cells, these granules demonstrable at high voltages were reduced in size, and there was evidence that the nuclear material was then partially in solution. *A Neisseria meningitidis* strain also showed granules insoluble in hot water and probably nuclear in nature. On the other hand, cells of strains of *N. gonorrhocae, S. aureus,* and *Streptococcus pyogenes* (two strains) appeared homogeneous at all voltages. Thymonucleic acid having been demonstrated by others in these strains of *S. pyogenes,* it is believed probable that their cells contain nuclear material in solution or very fine dispersion. Cells of *Brucella abortus* and *Pasteurella pestis* appeared uniform or exhibited transparent areas in very young, actively growing cultures. Gradually one or more transparent areas were seen which are believed to have later become opaque. It is thought probable that these phenomena represented vacuoles and reserve material. The results of the study support the theory that different bacteria may contain nuclear material in different states, and that the state may change with the developing cell.

Factors which influence the growth of heat-treated bacteria.—I, A comparison of four agar media, F. E. NELSON. (Kans. Expt. Sta.). (*Jour. Bact., 45 (1943), No. 4, pp. 395–403*).—With the use of *Pseudomonas aeruginosa, Escherichia coli, Bacillus subtilis, Staphylococcus aureus, Streptococcus liquefaciens, S. zymogenes,* and *S. durans* as test organisms, apparent survival after heat treatment was found to vary considerably with different media. The relative suitability of media for determinations of viable populations after heat treatment also varied according to the organism employed. Use of beef-infusion agar in most cases resulted in the largest counts of viable bacteria, but new standard milk agar proved superior to nutrient agar for enumerating viable organisms of most of the heat-treated thermoduric lactic streptococci Bacteria subjected to heat at partially lethal levels were more demanding in their requirements of media for growth than were unheated control organisms. In formulating media for bacterial counts in heated food products and in studies of the effects of heat on micro-organisms, these findings should be considered.

The simple holocarpic biflagellate Phycomycetes, including a complete host index and bibliography, J. S. Karling (*New York: Author, 1942, pp. 123+, illus. 29*).—"This small volume on the simple, holocarpic, biflagellate Phycomycetes is the second [E. S. R., 87, p. 808] in a series of lectures presented to graduate and research students of mycology at Columbia University on the origin, development, phylogeny, and evolution of the lower organisms." A host index of plant and animal genera and species, together with an inclusive bibliography, is presented in the final chapter, and separate bibliographies accompany the individual chapters.

Experiments in the grafting of species in the genus Viola, J. D. Dodd and A. Gershoy. (Vt. Expt. Sta. et al.). (*Bul. Torrey Bot. Club, 70 (1943), No. 2, pp. 91–103, illus. 6*).—Results demonstrating potentially successful grafts in 7 of the 10 possible interspecific combinations among the 5 species chosen to represent the wide range of morphological types in the genus led to the conclusion that the barrier to successful species grafts in *Viola* centers on a lack of adequate technic rather than on any so-called grafting incompatibilities arising from the phylogenetic divergencies of the species. Thus there appears to be no serviceable correlation of success in hybridization of species with species grafting.

The vegetation of Guatemala, a brief review, P. C. Standley and J. A. Steyermark (*Chron. Bot., 7 (1943), No. 7, pp. 315–318, illus. 1*).

Outline of the geographic distribution of plants in Mexico, I. Ochoterena, trans. by F. P. Villagrán (*Chron. Bot., 7 (1943), No. 7, pp. 311–315*).

Vegetational zonation in the Rocky Mountains, R. F. Daubenmire. (Univ. Idaho). (*Bot. Rev., 9 (1943), No. 6, pp. 325–393, illus. 6*).—A comprehensive review, with 175 references.

A botanical survey in the Iowa lake region of Clay and Palo Alto Counties, A. Hayden. (Iowa Expt. Sta. et al.). (*Iowa State Col. Jour. Sci., 17 (1943), No. 3, pp 277–415, illus. 38*).—This botanical and ecological study presents a summary of observations made during seven growing seasons beginning in April 1934. The flora reported includes 943 species (listed with annotations) made up of 818 seed plants, 9 ferns, 62 mosses, and 54 algae. The plants have significance to waterfowl—the main object of the study, selectively as the source of food materials and nest construction, collectively as cover, and in the sense of vegetations and floras as indicators of life zones. Previous studies of the area are reviewed, and detailed consideration is given to such matters as the physical environment (vegetation, climate, geology, soils, and physiography), the effects of occupation of the region by man, the natural vegetation, and the flora, including its distribution and economic significance.

The vegetation of the granitic flat-rocks of the southeastern United States, R. McVaugh. (U. S. D. A.). (*Ecol. Monog., 13 (1943), No. 2, pp. 119–166, illus. 35*).—The results of a detailed ecological study of these granitic exposures in Alabama, Georgia, and South and North Carolina are presented. The flora of the flat-rocks comprises roughly 100 species, including those occurring on all or nearly all the outcrops or known to be endemic or at least of restricted distribution. But few of these species are abundant elsewhere in the vicinity, and even these appear to be indigenous on the flat-rocks. There are over 70 references.

The use of bryophytic polsters and mats in the study of recent pollen deposition, G. Carroll. (Univ. Tenn.). (*Amer. Jour. Bot., 30 (1943), No. 5, pp. 361–366*).—This study of the modern pollen rain in a spruce-fir forest, using bryophytic polsters or mats as the source of accumulated grains, indicated that pollen can be recovered from many of these mats in sufficient numbers for statistical study. Use of this technic allows a study of such problems as over- and underrepresentation of species and the extent of dissemination. Details of the method and some of the results of its application are presented.

Resurvey of grasses, forbs, and underground plant parts at the end of the great drought, J. E. Weaver and F. W. Albertson. (Univ. Nebr. et al.). (*Ecol. Monog., 13 (1943), No. 1, pp. 63–117, illus. 70*).—Continuing this survey (E. S. R., 84, p. 180), the area under study included the western part of the true prairie in Iowa, eastern Nebraska, and Kansas, and the mixed prairie, with its short-grass disclimax, in western Kansas and Colorado. Five prairies in western Iowa, 12 in true prairie west of the Missouri River, and 12 in mixed prairie in Kansas have been studied year by year since the inception of the drought in 1933–34. This detailed study presents the record of their condition in 1940 near the end of the drought, and includes data on plant yields in relation to soil water contents, in addition to the conditions of grasses in the true and mixed prairie, and resurveys of the forbs and of underground plant parts.

Progress in utilization standards for western ranges, R. S. Campbell. (U. S. D. A.). (*Jour. Wash. Acad. Sci., 33 (1943), No. 6, pp. 161–169, illus. 3*).—This address reviews (21 references) the progress in investigations of the range condition, i. e., the relative state of health or productivity of the range, including both the soil and the forage with respect to its potential state and the best practicable management; the trend of range condition, viz, whether management is increasing the forage production of the range or causing it to go on the downgrade; factors influencing utilization of the range; determining proper utilization; measuring range utilization; application of the results of research on plant types, forage species, climatic variations, proper use, and methods of measuring utilization so that a fairly simplified procedure for application in range management by stockmen and range administrators may be evolved; and suggested lines for future range utilization research.

Unequal scales for rating species in communities, A. G. Vestal. (Univ. Ill.). (*Amer. Jour. Bot., 30 (1943), No. 4, pp. 305–310, illus. 1*).—In a study of frequency of occurrence in plats of tree species in mixed forests in east-central Illinois, it was found that the usual scale of five equal classes did not sufficiently bring out differences between the first one to three "most-frequent" and the next few "ordinarily frequent" species. This led to a study which sought to find an unequally 10-parted (and cognate 5-parted) scale for evaluating importance of species—a scale more smoothly graduated than some which have been used. Some of the published scales are reviewed, and the detailed results of this study are presented. "The recommended scales are based on a progression giving, in a total range of 100 units, an initial class range of 2.5, and a range for the last class of 20.9 units, or in the five-class form, 6.2 and 38.2 units, respectively." Examples are given of the different ratings obtained with three different scales applied to data on frequency of occurrence in plats of tree species, and of the use of scales to aid in distinguishing dominant and subdominant groups of species in mixed forest.

The reproductive capacity of plants: Studies in quantitative biology, E. J. Salisbury (*London: G. Bell and Sons, 1942, pp. 244+, illus. 43*).—The reproductive capacity of a species is said to be as much a characteristic as any other specific feature and also one of the greatest ecological importance. In this preliminary contribution to the quantitative study of the subject the author considers methods and terminology; the significance of seed size and its relation to habitat conditions; the viability of seeds from plants of diverse vigor; the influence of soil and climate on seed output and of competition on reproduction; the relation between seed number per capsule and number of capsules per plant; the comparative study of seed output and reproductive capacity; reproduction by seeds in relation to life span; seed production by parasites, saprophytes, and semiparasites; reproduction in terrestrial orchids, the Gentianaceae, and in the genera *Hypericum, Linaria,* and *Verbascum;* reproduction in relation to various habitats and colonization conditions; and vegetative multiplication in relation to competition. A bibliography and a subject-author index are provided.

A medium adapted to the bacteriophage of Rhizobium leguminosarum, T. Campbell and A. W. Hofer. (N. Y. State Expt. Sta.). (*Jour. Bact., 45 (1943), No. 4, pp 406–407*).—In a series of studies on soil bacteriophage, progress was found to depend on the development of better technic for the test-tube method of detection. A medium containing sauerkraut juice and calcium glycerophosphate (formula given) proved satisfactory.

Semi-quantitative determinations of bacteriophage in soils, E. J. Bottcher and A. W. Hofer. (N. Y. State Expt. Sta.). (*Jour. Bact.. 45 (1943), No. 4, pp. 407–408*).—The test-tube procedure of the preceding entry is purely qualitative. The method here outlined is designed to give a semiquantitative comparison of the amount of bacteriophage, effective against any particular organism, present in various soils.

The effect of biotin and thiamin on the growth of fungi isolated from lesioned roots of take-all affected wheat, N. H. White (*Jour. Austral. Inst. Agr. Sci. 9 (1943), No. 1, p. 36*).—All of 14 fungus species from lesions of *Ophiobolus graminis*-infected wheat grew in a basal synthetic medium without either biotin or thiamin; *O. graminis* grew without biotin, but not without thiamin. The results should aid in identifying *O. graminis* among isolates nonfruiting in ordinary media.

Induced autotrophism in yeast, L. H. Leonian and V. G. Lilly. (W. Va. Expt. Sta.). (*Jour. Bact., 45 (1943), No. 4, pp. 329–339*).—Using the technics of increasing the initial inoculum, prolonging the incubation period, and successively subculturing on media with one of the essential vitamins lacking, eight strains of *Saccharomyces cerevisiae* were induced to grow without an outside supply of one or more vitamins. Eventually the amount of inoculum and length of incubation period were reduced to normal, but the yeasts continued to grow as readily in the absence as in the presence of the vitamin. Yeasts grown in the absence of one vitamin often developed the ability to grow without one or more additional ones. At least two of the variants grew without any of the five vitamins known to be essential to yeasts. Reversions occurred in most cases after the variants had been grown continuously for 6 mo. on a medium containing all the essential vitamins.

The relation of certain fungi to thiamine, W. J. Robbins and R. Ma (*Bul. Torrey Bot. Club, 70 (1943), No. 2, pp. 190–197, illus. 3*).—With a combination of the results of this study, involving 12 species of *Ceratostomella* and 1 each of *Chalaropsis, Endoconidiophora, Mucor,* and *Polyporus,* with those summarized by Robbins and Kavanagh (E. S. R., 87, p. 644), 19 fungi are now known to require thiamin as such (mostly *Phytophthora* spp.), 15 are able to use the two intermediates, and 30 grow when supplied with pyrimidine alone. *Mucor ramannianus* remains as the only example of a fungus which grows in a medium supplemented with thiazole only. The possible origin and basis for these findings are discussed. Results by the authors and others support the assumption that the biosynthesis of thiamin occurs through the formation of pyrimidine and thiazole and the combination of these intermediates into thiamin. If these processes are enzymatic, as seems likely, it would appear that separate enzyme systems are concerned in the formation of each intermediate and in the union of the two into thiamin. Otherwise it would be difficult to understand how the loss of ability to synthesize one of the intermediates could occur without at the same time causing loss of ability to synthesize the other. In any event, the results of these studies emphasize the importance of thiamin as an essential metabolite for the fungi. There are 20 references.

Dehydrogenases of the Avena coleoptile, J. Berger and G. S. Avery, Jr. (*Amer. Jour. Bot., 30 (1943), No. 4, pp. 290–297, illus. 7*).—Using crude and partially purified enzyme extracts from the hollow cylinders of 3-day-old oats coleoptiles and the Thunberg technic, malic, fumaric, citric, cisaconitic, isocitric, and *l*-glutamic acids and ethyl alcohol were rapidly oxidized but glycerophosphate only slowly, indicating the presence of malic, isocitric, glutamic, and alcohol dehydrogenases, as well as fumarase and aconitases. Succinic dehydrogenase was absent. The malic and alcohol dehydrogenase activities were greatly accelerated by adding diphosphopyridinenucleotide and flavoprotein. The natural occurrence in the coleoptile of such coenzyme-active complexes is deemed probable, since by microbiological assay coleoptile tissues contained 70–110 μg of nicotinic acid and 23–31 of riboflavin per gram of dry weight. The optimum pH for the activities of malic and alcohol dehydrogenases was 7.8–8.3. In 3-day-old seedlings malic and isocitric dehydrogenases were found in extracts of the first foliage leaf, decapitated hollow cylinders, 2-mm. coleoptile tips, roots, and residual endosperm.

Action of synthetic auxins and inhibitors on dehydrogenases of the Avena coleoptile, J. Berger and G. S. Avery, Jr. (*Amer. Jour. Bot., 30 (1943), No. 4, pp. 297–302*).—In studies using the Thunberg technic, it was found that naphthaleneacetamide and indoleacetic, naphthaleneacetic, and indolebutyric acids have no accelerating effects on the activity of malic dehydrogenase at 0.05 and 1 mg./l., whereas at 1,000 mg./l. they were inhibitory. Indoleacetic and naphthaleneacetic acids likewise failed to accelerate the fumarase or alcohol dehydrogenase activities. There was no succinic dehydrogenase activity in extracts from 3-day-old coleoptiles. Succinic dehydrogenase activity of calf kidney preparations was not affected by 0.05–1,000 mg./l. indoleacetic acid. Fumarase and malic dehydrogenase were relatively insensitive to iodoacetate, but the alcohol dehydrogenase was markedly inhibited by 10^{-4} M concentration. Oxaloacetic acid was a strong inhibitor for malic dehydrogenase, but pyruvic acid, arsenite, urethane, pyrophosphate, and maleate were noninhibitory. The fact that synthetic auxins failed to accelerate in vitro activity of the three enzymes studied does not exclude the possibility that they may be active at some other point in dehydrogenase systems.

The relationship between nitrogen transport and metabolism in the oat seedling, H. G. Albaum (*Amer. Jour. Bot., 30 (1943), No. 4, pp. 302–305, illus. 2*).—The evidence presented is believed to indicate that the movement of N from the endosperm to the embryo in growing oats seedlings is under control of the embryo respiratory metabolism. When the embryo metabolism was poisoned by azide during early growth stages and by iodoacetate during later stages, N transport in the intact seedling was inhibited. The poisons used had no effect on proteolysis in the endosperm and therefore do not block transport in this way. The same kind of inhibition of N transport or uptake may be demonstrated for isolated embryos by use of asparagine as a N source and sucrose as a respiratory substrate. The iodoacetate inhibition of N uptake by isolated embryos, as in the case of growth, can be "reversed" by pyruvate.

Further experiments on the nutrition of isolated tomato roots, J. Bonner (*Bul. Torrey Bot. Club, 70 (1943), No. 2, pp. 184–189*).—In continuation (E. S. R., 84, p. 597), all of three clones of isolated tomato roots studied were found to grow luxuriantly through repeated transfers in nutrient solution containing thiamin and pyridoxine, but none of them made continued growth with thiamin and glycine as accessory growth substances. One clone responded with increased growth when nicotinic acid was included in addition to thiamin and pyridoxine; the other two clones did not.

Pollen germination and pollen tube growth, as influenced by pure growth substances, F. T. Addicott (*Plant Physiol., 18 (1943), No. 2, pp. 270–279*).—In tests of 33 pure growth substances (including vitamins) on pollen of *Tropaeolum majus* and *Milla biflora*, 16 were found to increase germination or tube growth significantly. The results also supported the view that germination and growth of the tube are at least in part physiologically independent, certain substances affecting one process but not the other.

Growth of fruits in Cattleya and allied genera in the Orchidaceae, R. E. Duncan and J. T. Curtis. (Wis. Univ.). (*Bul. Torrey Bot. Club, 70 (1943), No. 2, pp. 104–119, illus. 28*).

The effect of ringing and transpiration on mineral uptake, F. C. Steward (*Ann. Bot. [London], n. ser., 7 (1943), No. 25, pp. 89–92*).—Critique of the paper by Phillis and Mason previously noted (E. S. R., 84, p. 449).

Studies in germination and seedling growth.—I, The water content, gaseous exchange, and dry weight of attached and isolated embryos of barley, R. Brown (*Ann. Bot. [London], n. ser., 7 (1943), No. 25, pp. 93–113, illus. 7*).—The rate of water uptake of the embryo in the seed was found to be lower than that of the isolated embryo when both seed and embryo floated on water. The difference was attributed to a low water availability in the seed, this being determined by the low permeability of the seed coat. The rates of O_2 uptake and of CO_2 emission by the embryo of the intact seed floated on water were low. When the embryo was excised and transferred to water both gaseous rates increased. The low rates in the seed are attributed to low availability of water and O_2, determined primarily by the low permeability of the seed coat to both. The water content and gaseous exchange determinations provided the data for evaluating the O_2 and CO_2 concentrations with which the seed contents were in equilibrium. The estimated average values were 10 percent for O_2 and about the same for CO_2. When the excised embryo was transferred either to water or to a fluid culture medium there was an immediate drop in dry weight, apparently indicating a leaching effect. After the initial fall the dry weight continued to decrease, but less precipitately than at first. No comparable dry weight decrease was observed in the embryo of the intact seed, the difference probably being due in part to the higher respiratory rate of the isolated embryo. The effect on isolated embryos of the nutrient in the artificial medium was to increase slightly the rates of the exchange and to promote a slightly higher water content some hours after excision. In terms of the relations studied, the effect of the time of excision on the subsequent course of development during the experimental period of 12 hr. was only slight. After excision the changes followed the same course whatever the time of excision. However, since excision induces a more rapid water uptake and increases both rates of gaseous exchange it also promotes a more rapid development, at least immediately after excision. Thus within the experimental series, at any appropriate time, the embryos excised at any early stage reach a more advanced developmental stage than others excised later. There are 24 references.

An auto-irrigator for growing plants in the laboratory, A. D. MOINAT (*Plant Physiol., 18 (1943), No. 2, pp. 280–287, illus. 1*).—The irrigator described depends on the capillary rise of water through sand to supply plants growing in soil above a porous plate embedded in the surface of the sand. By varying the depth of the sand or its textural grade, moderate-sized plants can be grown under conditions of high, low, or moderate moisture supply. The Bouyoucos electrical resistance apparatus offers a method of following soil moisture conditions in the irrigator without disturbing the soil, but the accuracy of this method proved to be less at the higher moisture contents.

Metabolic activities of roots and their bearing on the relation of upward movement of salts and water in plants, T. C. BROYER and D. R. HOAGLAND. (Univ. Calif.). (*Amer. Jour. Bot., 30 (1943), No. 4, pp. 261–273, illus. 5*).—In various experiments (mostly on barley) with roots having a high potentiality for salt absorption (low-salt, high-sugar status), large differences in transpiration due to variations in light and humidity had little influence on salt absorption and movement to the shoot. Salt absorption in plants initially higher in salt and lower in sugar was affected much more by light and humidity, but the effect of aerial environment on metabolic processes must be considered in interpreting results. Under some conditions, however, reducing transpiration to the greatest possible extent may prevent salt movement upward, at least for short periods. The role of transpiration in upward movement is not excluded, despite the importance of metabolic factors. An experiment is reported in which high concentrations of NaCl in the nutrient solution resulted in injury to the root systems of barley plants. The results on salt absorption suggest the possibility that a wicklike action in salt movement may have a greater influence than metabolic factors when root injury becomes marked.

Effect of salt concentration, kind of salt, and climate on plant growth in sand cultures, O. C. MAGISTAD, A. D. AYERS, C. H. WADLEIGH, and H. G. GAUCH. (U. S. D. A. et al.). (*Plant Physiol., 18 (1943), No. 2, pp. 151–166, illus. 9*).—When milo, cotton, alfalfa, sugar and garden beets, barley, tomato, squash, cowpeas, onion, navy bean, and carrot were grown in sand cultures at three diverse climatic locations at salt concentrations of 0.4–4.5 atmospheres, total concentration proved a greater factor in determining the amount of growth reduction than effects of specific ions. Growth reduction in most cases was linear with increasing osmotic concentration. Conductance of the nutrient solution characterized the total salt effect probably as well as osmotic concentration. Chlorides and sulfides, compared on an equal osmotic basis, depressed growth equally with a number of crops, but with others the chlorides were slightly more toxic than the sulfates at equal osmotic concentrations. Within the ratios of cations used, there was no great difference in the action of individual cations on plant response. Na did not appear to be an unduly toxic cation in sand cultures. Crops do not behave alike in their reactions to the combined effects of salt and climate. Thus some are reduced equally in relative yield at a given salt concentration irrespective of climate, whereas most crops at the same salt concentration are depressed in relative yield more in warm than in cool climates. A number of crop species died in culture solution having an osmotic concentration of 4.5 atm.

Rôle of ether soluble organic acids in the cation-anion balance in plants, E. C. PIERCE and C. O. APPLEMAN. (Md. Expt. Sta.). (*Plant Physiol., 18 (1943), No. 2, pp. 224–238, illus. 6*).—Chemical analyses of 12 plant species grown in the greenhouse under controlled solution culture and the same nutrient supply indicated the inorganic ions to be taken up in varying proportions according to inherent characteristics of the species, the proportions in plants of the same family tending to be similar. In some plants the unknown fraction of organic acids made up 70–80 percent of the total, whereas in others this fraction amounted to only 15–25 percent. Except for cantaloup, a large excess of inorganic cations over inorganic anions was found, and when all other plants were considered together this excess proved to be highly correlated with total ether-soluble organic acids. Cantaloup contained the largest amounts of cations but the smallest amounts of organic acids. In the leaves, malic and citric acids showed a rather low positive correlation with soluble Ca. Citric acid and those acids of the unknown group showed a rather small negative correlation with total Mg content in the stems and petioles. In the plants as a group, insoluble oxalates and insoluble Ca were highly correlated. In three cases insoluble oxalic acid exceeded the amount of Ca, and the evidence indicated that the former was present as magnesium oxalate. The Mg increased with the oxalic acid content. Plants with little or no oxalic acid had a large proportion of their Ca in a sap-soluble state, whereas those high in oxalic acid had but traces of the sap-soluble Ca.

The boron content of certain forage and vegetable crops, R. I. Munsell and B. A. Brown. ([Conn.] Storrs Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 5, pp. 401–408*).—Analyses for B are reported for alfalfa, soybeans, cereals, vegetables, root crops, and certain miscellaneous crops. The legumes proved highest in B content, followed by root crops, all vegetables (except spinach, which stood at the head for B), the grasses, and finally the cereals. Analyses of various parts of the soybean plant indicated the leaf to be highest in B, followed by the petiole, stem, and root. In pot tests with Charlton soil, the amount of B in the soybean leaf declined the first year as the rate of liming increased. In the second year, the B content decreased wherever less than 20 lb. of borax per acre had been applied. In field tests on two Merrimac soils, no decrease in B occurred in alfalfa or the vegetable and root crops when the liming rate was doubled. Deficiency symptoms were prevented or yields increased by applying borax at the rate of 20 lb. per acre to alfalfa, turnips, mangels, cabbage, carrots, lettuce, and spinach.

Soluble constituents and buffer properties of orange juice, E. T. Bartholomew and W. B. Sinclair. (Calif. Citrus Expt. Sta.). (*Plant Physiol., 18 (1943), No. 2, pp. 185–206, illus. 13*).—The percentages of total solids and total sugars increased and those of acids decreased at about the same rate in juices of Washington Navel and Valencia orange fruits during maturation. After attainment of commercial maturity the percentages of total solids and of total and reducing sugars continued to increase, while the sucrose and acids decreased with advance of season, but the rate of increase in total solids was not so great as that of the total and reducing sugars. From September 29 (fruit still green) until March 2 (well beyond initial maturity), the soluble solids of Washington Naval orange juice are composed of about 63–77 percent total sugars, 23–8 percent acids, and 15 percent other substances, and the values for Valencia juice are similar. An increase in total soluble solids generally involved a corresponding increase in total sugars. A similar relation between total soluble solids and reducing sugars was noted but a considerably greater scattering of the points in the curve occurred. Although the total acids decreased during growth and ripening, while total soluble solids increased, large fluctuations in acid occurred without change in total soluble solids and vice versa. Negative correlations existed, however, between total soluble solids and total acids. Because of the relatively high buffer capacity of the juice, large fluctuations in total acidity occurred without change in pH, but over a wide range of acid concentrations the pH increased with decrease in total acidity. The buffer capacity was found due chiefly to organic acids and inorganic salts; the soluble pectins affected this capacity only slightly. Boiling for 45 min. increased the initial pH of the juice 0.2 over that of normal juice, raising the buffer curve to a slightly higher pH level but leaving the shapes of the curves the same. Although the limits of dilution were not reached in these studies, diluted (1:4) and undiluted juice had the same buffer capacity.

An air pump of low capacity, E. B. Working. (Kans. Expt. Sta.). (*Plant Physiol., 18 (1943), No. 2, pp. 310–312, illus. 2*).—The pump described and illustrated was designed for use in studies of the respiration and heat production of wheat, where it was desired to draw a slow stream of air through the grain over long periods of time. It is a pump of low capacity, with mercury valves, the position of the piston adjustable, and made either of aluminum alloy or of glass and rubber tubing.

Molecular equivalence of carbohydrates to carbon dioxide in photosynthesis, J. H. C. Smith (*Plant Physiol., 18 (1943), No. 2, pp. 207–223*).—It is concluded from the evidence presented that the equivalence demanded by the photosynthesis equation for carbohydrate formation from CO_2 has been demonstrated for sunflower leaves. There was a temperature effect on the proportion of the different classes of carbohydrates recovered after short periods of photosynthesis, this effect appearing to favor the accumulation of disaccharides, such as sucrose, at the lower temperature. The C content of the material accumulated during photosynthesis approached that of a disaccharide. It was considerably lower than the average C content of the organic material of the leaf, indicating that metabolic reactions subsequent to photosynthesis tend to convert the material photosynthesized into compounds of higher C content. It is believed that respiration and transformation of the organic material formed during photosynthesis may follow different courses in different samples of sunflower leaves, but in most cases the principal material respired appears to be carbohydrate. Only after examining a large number of plant species will it be permissible to generalize more extensively on these results obtained with sunflower leaves.

The American mistletoe with respect to chlorophyll and photosynthesis, R. O. Freeland (*Plant Physiol., 18 (1943), No. 2, pp. 299–302, illus. 1*).—Extinction coefficients for the green pigments in *Phoradendron flavescens* indicated the presence of chlorophylls *a* and *b*, and CO_2 determinations with the parasite on amputated stems of the host plant in water indicated that photosynthesis occurs in this species.

The isolation, agglutination and nitrogen analysis of intact oat chloroplasts, A. W. Galston. (Univ. Ill.). (*Amer. Jour. Bot., 30 (1943), No. 5, pp. 331–334, illus. 1*).—Using the technic of Granick (E. S. R., 81, p. 21) for extracting intact chloroplasts, shown to be applicable to fibrous grass leaves, oats leaves were found to contain about 30–40 percent of the total leaf N in both green and chlorotic leaves at all ages studied. In any one leaf, chloroplasts produced about 30 percent of the total protein, the "cytoplasm" producing the remainder. An agglutinin extracted from castor-bean seeds proved capable of precipitating chloroplasts from glucose suspension at appropriate pH levels. The isoelectric range of the extracted agglutinin was 4.2–4.6, indicating its probable identity as the albumin ricin. Thus ricin possesses the power of agglutinating both erythrocytes and chloroplasts.

Note on photosynthetic activity in seeds of the spider lily, L. H. Flint and C. F. Moreland. (La. State Univ.). (*Amer. Jour. Bot., 30 (1943), No. 4, pp. 315–317*).

The relation of anatomy and cytology to the classification of the Leguminosae, H. A. Senn (*Chron. Bot., 7 (1943), No. 7, pp. 306–308*).—The author briefly reviews recent work on the legumes along these lines and calls attention to the fact that this group offers favorable material for studies of the relation and possible parallelism between cellular or histological characters and gross morphology. "The anatomical and cytological evidence helps in evaluating broad phyletic trends, and when it is eventually correlated with the taxonomic evidence may make possible a new, more natural, detailed conspectus of the family."

The metaphase stage in colchicinized onion root-tips, M. Levine and S. Gelber (*Bul. Torrey Bot. Club, 70 (1943), No. 2, pp. 175–181*).—Onion root tips grown in water for 10–15 days averaged 3.6 percent of cells in metaphase. Roots exposed to 0.01 percent colchicine for 6–24 hr. contained a gradually increasing proportion of cells in metaphase, which reached its maximum at 24 hr. Continued exposure for longer than 24 hr. showed a gradual decline in number of mitotic stages to a point slightly below the figure observed for the untreated tips. The differences between extremes in number of metaphase stages in untreated and treated root tips were about the same except at the critical exposures, shown here to be 24 hr. with 0.01 percent colchicine, where the variation was greatest. The number of metaphases in the treated tips is predictable within the limits of variation of the 24-hr. treatment as here given. Simple plant structures like the onion root tip are thus apparently suitable for the initial studies of the combined effects of colchicine and X-rays.

Macrosporogenesis, fertilization, and early embryology of Taraxacum kok-saghyz, H. E. Warmke and E. W. Brandes. (Coop. U. S. D. A.). (*Bul. Torrey Bot. Club, 70 (1943), No. 2, pp. 164–173, illus. 33*).—The chromosome number is $n=8$ and $2n=16$, placing this species among the basic diploids of the genus. Marcrogametophyte formation was found to follow the usual sexual pattern. Thirty min. after pollination, pollen tubes enter the macrogametophyte, and fertilization follows the normal patterns. The first division in the endosperm occurs about 6 hr. after pollination, and the first division of the egg follows about an hour later. Embryonic development follows the aster type, characteristic of the composites. Chromosome counts verified the reality of the sexual processes by showing the developing embryo to be diploid with 16 chromosomes, and the endosperm triploid with 24. During summer, *T. kok-saghyz* is highly self-sterile but cross-fertile, but in later fall and winter it may exhibit considerable end-season self-fertility.

The role of the epidermis in foliar organization and its relations to the minor venation, R. B. Wylie (*Amer. Jour. Bot., 30 (1943), No. 4, pp. 273–280, illus. 11*).—For 46 species of mesomorphic leaves the epidermal layers constituted 20 percent of the volume of the blade between the veins and, because of the mesophyll spaces, made up a greater proportion of its tissue. From the results of experiments presented in detail, it is concluded that the living tissues with diminished chlorophyll content (vein extensions and epidermal layers) contribute to the support of the blade and constitute in some degree a supplementary conductive system in mesomorphic leaves.

Vascular differentiation in the shoot apices of ten coniferous species, A. S. Crafts. (Univ. Calif.). (*Amer. Jour. Bot., 30 (1943), No. 5, pp. 382–393, illus. 9*).—Studies of 10 additional species (*Cedrus atlantica, C. deodara, Cupressus arizonica, Juniperus horizontalis, Libocedrus decurrens, Pinus halepensis, Pseudotsuga taxifolia, Sequoia gigantea, Taxodium distichum,* and *Torreya californica*) confirm the previous findings on *S. sempervirens* (E. S. R., 89, p. 193). The protophloem-procambium system appears adequate to conduct both organic and inorganic nutrients, hormones, and other accessory growth factors to the apical meristems of coniferous plants, provided the conditions in these 11 species are general for the group.

Wood structure of Ryania, M. W. Bannan (*Amer. Jour. Bot., 30 (1943), No. 5, pp. 351–355, illus. 37*).—This genus of shrubs or trees, species of which are native to northern South America and Trinidad, is of pharmacological interest and is being studied by others because of its poisonous content. This attempt to discover constant anatomical differences among the species gave preliminary evidence that combinations of size groupings of the various wood elements exist in the different species, but no "qualitative" differences such as structure, shape, or cell-wall pitting were observed.

GENETICS

Gregor Mendel and his work, H. Iltis (*Sci. Mo., 56 (1943), No. 5, pp. 414–423, illus. 9*).—A review of Gregor Mendel's early surroundings and his contributions to the development of genetics through painstaking observations on the behavior of individual characteristics in heredity.

Curly coat of horses, L. H. Blakeslee, R. S. Hudson, and H. R. Hunt. (Mich. Expt. Sta.). (*Jour. Hered., 34 (1943), No. 4, pp. 115–118, illus. 3*).—A curly coat condition of Percheron horses was inherited as a recessive to the normal. The condition occurred in 5 of 42 foals produced by a Percheron stallion mated to mares sired by another related stallion and in 3 other foals related to them. It was considered that these stallions and related mares were heterozygous for the curly coat factor.

A measure of persistency of lactation in dairy cattle, T. M Ludwick and W. E. Petersen. (Minn. Expt. Sta.). (*Jour. Dairy Sci., 26 (1943), No. 5, pp. 439–445, illus. 1*).—A general measure for persistency was formulated as

$$P=\frac{\frac{X_2n}{X_1}+\frac{X_3(n-1)}{X_2}+\frac{X_4(n-2)}{X_3}+\ldots\frac{X_n(n-\ (n-2))}{X_{n-1}}}{n(n-1)\ -(n-1)\ \frac{(n-2)}{(2)}},$$

wherein P refers to persistency, X designates the production of any particular period indicated by the subscripts, and n the number of divisions into which the lactation is divided. The analysis was based on approximately 500 records of Jersey, Holstein, and Guernsey cows made under standardized conditions.

Some genetic aspects of persistency in dairy cattle, T. M. Ludwick, W. E. Petersen, and J. B. Fitch. (Minn. Expt. Sta.). (*Jour. Dairy Sci., 26 (1943), No. 5, pp. 447–455*).—An analysis of the persistency values by the above methods on 130 registered Guernsey, Holstein, and Jersey cows from the standpoint of the daughters of the same sires and dams and the effect of common genetic and environmental influences, such as age, consecutive lactations, and physiological effects, indicates that persistency is definitely influenced by heredity. Evidence for this was shown in the smaller standard deviation of persistency of cows having one or two parents in common and the similarity of successive lactations. The relationship of total production to persistency, although close, seemed to be curvilinear rather than linear. Although persistency was clearly hereditary, its mode of transmission was complex.

A congenital hereditary eye defect of cattle, P. W. Gregory, S. W. Mead, and W. M. Regan. (Univ. Calif.). (*Jour. Hered., 34 (1943), No. 4, pp. 124–128, illus. 2*).—A fourth autosomal recessive anomaly uncovered in connection with the inbreeding studies of Jersey cattle to increase milk and fat production (E. S. R., 89, p. 43) is described. The lens was dislocated and smaller than normal in affected animals. One sire mated with more or less related cows produced 11 out of 16 calves with defective eyes. An ophthalmologic study of the defective eyes showed them to be like the cataractous eyes in Holsteins described by Detlefsen and Yapp (E. S. R., 43, p. 669).

Building breeds for the Tropics, A. O. Rhoad (*U. S. Dept. Agr., Off. Foreign Agr. Relat., Agr. in Americas, 3 (1943), No. 5, pp. 86–87, illus. 3*).—The development for tropical conditions of the Santa Gertrudis breed of cattle by crossing the zebu with Shorthorns and selecting for heat tolerance and high productive efficiency is reviewed.

Skin folds in sheep, M. A. Madsen, A. C. Esplin, and R. W. Phillips (*Utah Sta. Bul. 307 (1943), pp. 13, illus. 2*).—Skin folds, designated on an empirical basis from 1 to 8, for 50 Rambouillet sheep showed a correlation of 0.32 between the body scores of the dam after shearing and the body score of the daughters at birth. Daughters' scores at other ages did not give significant correlations. The average body score of 2.6 after birth increased to 2.96 before shearing and 4.4 after shearing, showing an increase in skin folds with age and that the folds may be covered and partially obliterated by long wool. Highly significant correlations of about 0.5 to 0.6 were found between body scores for skin folds taken at birth, at 6 mo., and after shearing. Values for the regression formula $Y=a+b_{yx}X$ are presented and show that skin fold characters are highly predictive for later ages.

The inheritance of pigmented wool, R. B. Kelley (*Jour. Council Sci. and Indus. Res. [Austral.], 16 (1943), No. 1, p. 10*).—In an F_2 generation from reciprocal crosses of white-wooled and pigmented sheep, there were produced 21 white and 6 pigmented lambs. The recessive condition of pigment was suggested by the production of 103 white-wooled and no pigmented lambs by crossing white-wooled and pigmented parents. The backcross of F_1 progeny to pigmented parents produced 37 white-wooled and 46 pigmented lambs.

Characteristics and production of old-type Navajo sheep, C. T. Blunn. (U. S. D. A. et al.). (*Jour. Hered., 34 (1943), No. 5, pp. 141–152, illus. 5*).—Continuing previous studies (E. S. R., 83, p. 326), Navajo carcass and wool data from the flock at the U. S. D. A. Southwestern Range and Sheep Breeding Laboratory are presented for 1937–42. These results show the general inferiority and variability of Navajo sheep in factors for quality of carcass and wool and their superiority over domestic breeds in milk production and maternal instinct under unfavorable environmental conditions. Improvement in weight by selection over the 5-yr. period is noted. Some of the characters of body and fleece, including color pattern, wattles, short ears, and horned condition, are rarely if ever found in domestic breeds on the western ranges.

Sexual development in small and large types of swine, R. W. Phillips and J. H. Zeller. (U. S. D. A.). (*Anat. Rec., 85 (1943), No. 4, pp. 387–400, illus. 7*).—Sexual development was studied in 35 small-type and 45 large-type Poland-China boars from 5 to 40 weeks of age. The seminiferous tubules began to increase in size at 10 to 15 weeks, with rapid development continuing up to 27.5–30 weeks of age. No clear-cut differences in the rate of sexual development in the two types were observed. Spermatozoa were first noted in the seminiferous tubules at 20 weeks and in all boars after 25 weeks of age. The testes grew rapidly in weight between ages of 17.5 and 20 weeks and continued fairly constant to 40 weeks. In relation to body weight, testes development increased slowly up to a body weight of 80 to 85 lb. In most cases the left testis was heavier than the right. The first oestrus ascertained by observation of the vaginal enlargement and mating with a teaser boar occurred in 24 small-type gilts at 207.8 days and 39 large-type gilts at 198.7 days of age. The age of first oestrus was not so well fixed in small-type as in large-type gilts, and the possibility of a lower level of pituitary gland activity of small-type gilts is suggested.

Genetics of the Burmese cat, J. C. Thompson, V. C. Cobb, C. E. Keeler, and M. Dmytryk (*Jour. Hered., 34 (1943), No. 4, pp. 119–123, illus. 4*).—In cats four allels of albinism in order of decreasing pigmentation are known: (1) Tabby or black, (2) silver (smoke), (3) Burmese, and (4) Siamese. A possible fifth color variation, intermediate between Siamese and Burmese, was described by L. Volk. In a cross of Siamese × Burmese cats, there were produced 34 Burmese to 27 Siamese kittens, with the sexes essentially equal. These results suggest the operation of a single pair of autosomal genes or that some independent autosomal gene manifested Burmese only in the presence of the Siamese pattern or converted some genotypically Siamese kittens into Burmese.

Silvering in a strain of guinea pigs, O. N. Eaton. (U. S. D. A.). (*Jour. Hered., 34 (1943), No. 4, pp. 105–107, illus. 1*).—A silvering character in brown guinea pigs is reported which is visible at birth but gradually disappears with maturity. Its mode of inheritance was complex. Silvering was present on self E, tortoise E^p, agouti A, and nonagouti a animals, but it was never observed in homozygous ss piebalds. Within the related stock, matings of nonsilver to nonsilver parents produced 266 progeny, of which 16.54 percent were silver. Among 340 progeny of silver × nonsilver parents, 32.65 percent were silver. Silver × silver parents produced 63.58 percent silver among 151 progeny. Linkage of the silvering factor with brown did not explain the situation since all browns were not silvered nor did crossing over in heterozygotes occur to give silvered blacks. Comparisons are given of silvering described by Ibsen (E. S. R., 68, p. 746), Lambert (E. S. R., 74, p. 622), and Wright (E. S. R., 88, p. 469).

Tests for recombination amongst three lethal mutations in the house mouse, L. C. Dunn and S. Gluecksohn-Schoenheimer (*Genetics, 28 (1943), No. 1, pp. 29–40*).—In further studies of the tailless condition in mice (E. S. R., 84, p. 313), no recombinations were found in 6,775 test animals produced by Tt^0, Tt^1, and T^0t^1 parents. Similar pleiotropic effects were produced by the allels t^0 and t^1. The gene T showed no crossing over with t^0 or t^1 and was probably allelic since Tt^0 individuals were viable. Mutations at the same loci may affect different processes as well as different parts of the same process. Some of the normal-tailed zygotes died at birth, with mortality falling most heavily on males. A deficiency of t^0t^1 mice in crosses involving heterzygotes was probably due to other genes causing the typical abnormalities.

Estimation of the size of comb on live fowl, D. G. Jones and W. F. Lamoreux. ([N. Y.] Cornell Expt. Sta.). (*Endocrinology, 32 (1943), No. 4, pp. 356–360*).—Data on the relation of linear measurements of the combs of 128 White Leghorn cockerels raised in different environments by Buckner et al. (E. S. R., 70, p. 667) showed that the product of length and width gave higher correlations with comb weight than were obtained with other measurements.

Stimulation of the development of the avian embryo by X-rays, A. A. Bless and A. L. Romanoff. (Univ. Fla. and [N. Y.] Cornell Expt. Sta.). (*Jour. Cell. and Compar. Physiol., 21 (1943), No. 2, pp. 117–121, illus. 2*).—When the X-ray doses to which eggs were exposed (opened in beakers, in the shell, or preheated) ranged up to 5,000 r, stimulating effects were observed on early embryonic development with small doses of about 250 r. Larger doses of X-rays inhibited early growth, and 5,000 r was lethal. The effects of preheating the eggs were almost negligible. Delay in hatching from X-ray exposure was not apparent until after 12 to 24 hr. Small doses had no effect on embryonic survival up to 5 days.

Stimulating effects of ultraviolet radiation on bioelectric potentials of an avian egg, A. L. Romanoff. ([N. Y.] Cornell Expt. Sta.). (*Jour. Cell. and Compar. Physiol., 21 (1943), No. 2, pp. 123–127, illus. 1*).—Continuing the above studies with X-rays, filtered ultraviolet rays stimulated development of preheated and 15-hr. incubated hens' eggs. Thus there was an appreciable increase in bioelectric potentials between blastoderm and albumin. The peak of stimulation was nearly twice as high at 3,560 a. u. as at 3,100 a. u. The potential difference and the embryonic activity were reduced beyond the stimulating region. The bioelectric potentials between the blastoderm and albumin were ascertained on 1,440 eggs exposed to varying quantities of radiant energy supplied by a quartz mercury-vapor lamp.

Quantitative genic-hormone interactions in the fowl.—I, Relative sensitivity of five breeds to an anterior pituitary extract possessing both thyrotropic and gonadotropic properties, S. S. Munro, I. L. Kosin, and E. L. Macartney (*Amer. Nat., 77 (1943), No. 770, pp. 256–273*).—Breed differences in the response of chicks of both sexes to daily injections over a 10-day period of a total of 18 mg. of concentrated anterior pituitary extract were apparent. When compared on the basis of their responses, the most pronounced were shown by White Leghorn males in comb development, by White Wyandottes of both sexes in the thyroids, by White Plymouth Rocks in the testes, and by New Hampshires in ovarian development. The oviducts were practically unaffected. The responses of strains in the same breeds differed, this being considered due to the genic control over the somatic response threshold. The results are based on a total of 533 chicks of the White Leghorn, New Hampshire, Light Sussex, White Plymouth Rock, and White Wyandotte breeds, with injections begun on the seventh day of age and the birds autopsied 24 hr. after the last injection. Contrary to previous studies (E. S. R., 84, p. 463), the more critical basis for comparison involved the organic weight corrected by regression to uniform body weights.

The genetic sex of pigeon-Ring dove hybrids as determined by their sex chromosomes, T. S. Painter and L. J. Cole. (Wis. Expt. Sta. et al.). (*Jour. Morphol., 72 (1943), No. 3, pp. 411–439, illus. 38*).—The diploid chromosome number of the pigeon was found in this cytological study to be about 68±4. In the male there were three pairs of large elements, three pairs of medium size, and a large number of pairs of short rods and dotlike chromosomes. In the female one of the medium-sized chromosomes was without a mate, but in the genetic male pairing was complete. The heavy mortality of females observed in cytological studies and the lethal condition seemed to be the reason that few female embryos hatched from the cross of pigeons and ring-necked doves. Analysis of clutch records supported these considerations.

Interrelationships of the cellular characters of several species of Columba, M. R. Irwin and R. W. Cumley. (Wis. Expt. Sta.). (*Genetics, 28 (1943), No. 1, pp. 9–28*).—Further study of the interrelationship of the cellular components of 11 *Columba* species (E. S. R., 88, p. 37) showed that an appreciable proportion of identical or related biochemical components, in addition to those specific for each species, were observed. Pooling the sera from several representatives made impossible the determination of individual differences, although they may exist. Antisera against each of the species were produced in the rabbit. Following absorption by the cells of another species, they reacted in various degrees with corpuscles of all other species. The relationships of guinea antisera with the components of other species are discussed in detail as examples of the ramifications that may be found in the reactions between species. The evidence indicates that the biochemical characters of the cells of the dove and pigeon species differentiating the one from another are produced by the action of one or more genes on each of a relatively small group of chromosomes. Knowledge of the structural changes may be anticipated from chemical assays.

Immunogenetic studies of species relationships, M. R. Irwin and R. W. Cumley. (Univ. Wis.). (*Amer. Nat., 77 (1943), No. 770, pp. 211–233, illus. 1*).—The results of different investigations indicated that a very large number of cellular antigens are present in animal and plant species, making plausible the postulate that one or more genes on at least the majority of the chromosomes of species may have effects on cellular antigens. Thus genetics and immunology have been mutually helpful in the advances made in these subjects. The role of specific genes on the cellular characteristics of pigeon species was brought out in previous investigations and of various reactions observed (E. S. R., 84, p. 314). Four kinds of individuals appeared in the backcross of Senegal × pearlneck hybrids mated to Senegal males, i. e. (1 and 2) those with either d–6 or d–11, (3) those with both, and (4) those with neither. Segregations of d–6 and d–10 were not always possible. In 11 species of *Columba*, antigens peculiar to each were usually shared and interlocked with certain others to make the specific groupings. Antigens peculiar to one species in comparison with others were usually shared, at least in part, with several species. In these species, whose species-specific antigens have been segregated in backcrosses, the serum from one species was distinguished from another by at least three to five serum antigens. It may be assumed that all the biochemical constituents of the serum are gene-determined. In general, these were both specific and common, cellular and serum components. The application of these findings with pigeons to other animals and humans are discussed.

The relation of the endocrine system to the regulation of calcium metabolism, I. L. Campbell and C. W. Turner (*Missouri Sta. Res. Bul. 352 (1942), pp. 134, illus. 17*).—A study of the anatomy of the parathyroid glands of chicks, rats, mice, guinea pigs, rabbits, and goats is presented. The relationship of the parathyroid weights to body weights in rats, rabbits, and goats of both sexes and females in various stages of reproduction and lactation showed that rabbits had the largest and rats the smallest glands in reference to body weight. The size of the parathyroid did not change during pseudopregnancy or pregnancy, but the weights of the gland were significantly increased after 10, 20, or 30 days of lactation. Parathyroidectomy in goats caused a sharp drop in serum calcium levels, but parathyroid extract administered by injection had no effect on the calcium content of the blood of month-old chicks. Young chicks were more resistant to sodium citrate injections than mice. Injection of large doses of extracts from normal and pregnant cattle pituitaries did not stimulate cell division in the parathyroid glands of chicks, rats, or mice. However, extracts of sheep pituitary increased the weights of the parathyroid glands of male rats. Consideration of pituitary effects indicated that the thyrotropic and gonadotropic hormones were not significantly affected by differences in the calcium and vitamin D contents of the ration, although the vitamin D had a parathyroid-sparing action. In connection with increased calcium-phosphorus levels in the blood for 4 days or more, milk and fat production were not affected in goats. Cellular division in the parathyroid gland was inhibited by injection of oestradiol in young rats, but testosterone had no effect on male chicks. The influences of male and female hormones on the ash and growth of the bones of rats of the two sexes are discussed. In parathyroidectomized rats diethylstilboestrol injections resulted in a small increase in the bone ash and high mortality.

Formation in vitro of highly active thyroproteins, their biologic assay, and practical uses, E. P. Reineke and C. W. Turner (*Missouri Sta. Res. Bul. 355 (1942), pp. 88, illus. 17*).—The thyroidal potency of iodinated proteins was tested by their stimulation of oxygen consumption and body weight loss in the guinea pig and decrease in body length in the tadpole. The normal oxygen consumption during May, June, and July declined to 86 to 93.5 percent of that occurring during normal winter months. The relation between the percentage increase in oxygen consumption (y) and the logarithm of thyroxine dosage (x) in micrograms per 100 gm. of body weight was expressed by the equation $y=47.27 \log x-34.75$. After six daily oral doses of thyroxine, the percentage decrease in body weight was expressed by the equation $y=0.671 x-1.3$, where y equals the percentage decrease in body weight and x equals the daily thyroxine dose in micrograms per 100 gm. of body weight. Tadpoles did not metamorphose in a solution of artificial thyroprotein, although they responded readily to oral or intraperitoneal administration. Certain chemical changes in the iodination of proteins are discussed. The thyroidal potency of iodinated casein measured on tadpoles was approximately 10 percent that of thyroxine, but was only 4 percent that of thyroxine when administered orally to guinea pigs. Compared on an equal iodine basis, the thyroidal potency of iodinated casein was approximately equal to synthetic thyroxine in tadpole assays and 40 percent that of the thyroxine potency in oral administration to guinea pigs. Various compounds were found to have thyroidal potency on iodination. Artificial thyroproteins were found to alleviate the symptoms of thyroidectomy in goats and stimulate milk and fat secretion in goats and cows.

Dietary fatty livers in mice and sensitivity to exogenous estrogen, C. M. SZEGO and R. H. BARNES. (Univ. Minn.). (*Endocrinology, 32 (1943), No. 4, pp. 367–368*).—Ovariectomy of mice followed by a high fat diet increased the fat content of the livers after 8 days' feeding as contrasted with other females on a stock diet. Both groups reacted similarly to oestrogen administration.

The weight and thyrotropic hormone content of the anterior pituitary of swine, H. D. ELIJAH and C. W. TURNER (*Missouri Sta. Res. Bul. 357 (1942), pp. 27, illus. 12*).—Following a study of the anatomy of the swine pituitary, the relationship of the weights of 192 pituitaries to sex and various conditions of growth are presented. At birth the pituitaries weighed approximately 25 mg. Although they increased to approximately 800 mg. at maturity, the ratio of pituitary weight to body weight decreased rapidly as body weight increased up to about 65 lb., with a smaller decrease thereafter. The pituitaries of gilts and barrows had comparable weights, which were heavier than boars. The rangier type hogs had heavier pituitaries in reference to body weights than shorter and thicker hogs. Assays of the anterior pituitary for the thyrotropic hormone by the chick method (E. S. R., 82, p. 172) showed the amounts of hormones per gram of fresh anterior pituitary tissue to increase up to 300 lb. live weight, with decreases thereafter. Comparable thyrotropic potency was expressed for pituitary tissue from boars and gilts, but that from barrows showed a reduced thyrotropic hormone content. A greater thyrotropic potency was shown in the pituitary during periods of rapid growth by short, thick, and rapid-gaining swine than by the longer, rangier, and slower-gaining types. The pigs for the tests were selected from three strains of Poland Chinas characterized by (1) chunkiness, (2) length and legginess, and (3) intermediate between the two types.

Conception rate in dairy cattle by artificial insemination at various stages of estrus, G. W. TRIMBERGER and H. P. DAVIS (*Nebraska Sta. Res. Bul. 129 (1943), pp. 14*).—Among 295 cows given artificial services at various stages of the oestrous cycle there were 44 percent of conceptions at the start of oestrus, 82.5 percent of conceptions in those bred during the middle of the oestrous period, and 84 percent of conceptions for those bred in the middle of the oestrous cycle but rebred 24 hr. later. Of those bred at the end of oestrus, or 6 hr. after the end of the oestrous period, 75 and 62.5 percent conceived.

The percentage of conceptions decreased as insemination after oestrus was delayed. Two of 25 cows inseminated 36 hr. after oestrus conceived. In routine breeding with artificial insemination of 194 cows in connection with the regular breeding of the college herd, 63.4 percent conceived. Of the individuals failing to conceive, 22 percent did not come in heat at the next expected heat period.

Studies of respiration rate of dairy bull spermatozoa, R. E. Ely, H. A. Herman, and C. F. Winchester (*Missouri Sta. Res. Bul. 353 (1942), pp. 24*).—In a study of the relation between some of the physical and chemical characteristics of semen from dairy bulls and the respiratory activity of the spermatozoa, oxygen consumption was related to the degree of motility and the period of survival of sperm. Although semen collections were made with an artificial vagina, with preservation under uniform conditions, wide variations were found in oxygen consumption of different ejaculates from the same sire. Semen containing large numbers of abnormal sperm showed low oxygen consumption. Seminal fluid consumed oxygen at rates from 3.3 to 24 percent of normal semen. Centrifuging the semen caused a decrease in the number of living sperm and consequently a depression in the oxygen consumption. The aerobic respiration measurements were made with a modified Barcroft-Warburg respirometer. The motility ratings varied from 0 to 5 and storage from 24 to 192 hr. Intracellular reserves were an important factor causing spermatozoa metabolism and longevity.

Mitotic activity in the anterior hypophysis of female rats of different age groups and at different periods of the day, T. E. Hunt (*Endocrinolgy, 32 (1943), No. 4, pp. 334–339*).—Histological study of the hypophysis of 94 female rats ranging in age from 52 to 342 days showed the postovulatory mitotic activity to be greatest at 50 to 80 days of age, with gradual declines. After 300 days the number of mitoses was no greater than in young animals in dioestrus. There were significantly fewer mitoses in the 9-hr. period after midnight than at other times. Colchicine acting for 9 hr. apparently tripled the mitotic count.

FIELD CROPS

Vegetation zones of Hawaii, J. C. Ripperton and E. Y. Hosaka (*Hawaii Sta. Bul. 89 (1942), pp. 60+, illus. 10*).—The series of vegetation zones and phases, outlined and described as to climate, soils, and characteristic wild and planted species, are based on a vegetation survey of range lands of the Territory and available climatological data. Intended primarily for use in the study and classification of pastures, the proposed division into zones may be of general use to other phases of agriculture.

Grasses: Classification and description of species of Paspalum and Panicum in the United States, W. A. Silveus (*San Antonio, Tex.: W. A. Silveus, [1942], pp. 526+, illus. 403*).—This manual, copiously illustrated by photographs and drawings, contains illustrated keys to the groups, keys to the species, a list of grass names diacritically marked, and an index to Latin and common names of species.

Supplementary hay crops, G. H. Ahlgren (*New Jersey Stas. Cir. 465 (1943), pp. [4]*).—Practical instructions on growing, cutting, and handling annual hay crops, as soybeans, soybeans-Sudan grass mixture, oats, and oats-winter vetch mixture, considered the best crops to meet emergency feed shortages when permanent hay crops, as alfalfa and red clover, fail.

Minor elements stimulate pasture plants: A preliminary report, G. B. Killinger, R. E. Blaser, E. M. Hodges, and W. E. Stokes (*Florida Sta. Bul. 384 (1943), pp. 12 illus. 6*).—On three virgin soils, minor elements gave appreciable growth increases to grasses only in the presence of lime and complete fertilizer. The growth of Dallis, carpet, Bermuda, and Bahia grass was greatly increased on one virgin Leon soil and appreciably on another when certain minor elements were supplied in addition to lime and complete fertilizer. Carpet grass growth also was increased greatly in another location on Immokalee fine sand. Cu appeared to give best growth responses, with Mn, Zn, B, and Mg next in importance. Little or no growth response followed treatment with compounds of Fe and Co. On a Leon fine sand, California bur-clover was distinctly B deficient in the absence of B fertilization. B deficiency symptoms also occurred on several other soils. White Dutch clover did not display B deficiency symptoms but survived summer better after B application. The clovers did not respond appreciably to other minor elements.

As a practical consideration, Ca, P, and K should generally be supplied for legumes before treating with minor elements. For grasses, N also should be added before minor elements are applied. On soil types similar to those in these experiments borax might be used at the rate of from 5 to 10 lb. per acre for legumes. Grass may respond to from 10 to 20 lb. per acre of $CuSO_4$ and $MnSO_4$ and from 5 to 10 lb. of $ZnSO_4$ and borax, with the Cu being most likely to give the greatest response.

Influence of lime and fertilizers on pasture establishment and production at Jeanerette, La., 1932 to 1938, R. B. Carr and A. O. Rhoad. (Coop. La. Expt. Sta.). (*U. S. Dept. Agr. Cir. 666* (*1943*), *pp. 20, illus. 7*).—The influences of different fertilizer treatments and seeding combinations became less pronounced as nine 6-acre pastures were grazed by steers over a period of 6 yr. Steer gains per acre likewise varied less between pastures during the last year than in the earliest years. A close correlation was observed between the average steer gain and the forage yield per acre. The pasture receiving lime and complete fertilizer produced the greatest steer gains, but when total cost of treatment was considered the pasture only limed gave the largest net returns. Good pastures evidently can be produced and maintained on Gulf coast soils through the use of basic crops, as white clover, hop clover, Bermuda grass, and Dallis grass; adequate fertilizer; and good management, including periodic mowing and controlled grazing.

Relation of drouth and grazing to North Dakota range lands, W. Whitman, H. C. Hanson, and R. Peterson (*North Dakota Sta. Bul. 320* (*1943*), *pp. 29, illus. 15*).—Changes in grassland vegetation (E. S. R., 79, p. 184) on grazed ranges in western North Dakota were determined by permanent meter-square quadrats, 1932-41. The grassland deteriorated, 1932-36, primarily due to severe drought, but partly because of heavy grazing, while it showed continued improvement, 1937-41, due to cessation of drought with return to favorable moisture conditions and decrease in grazing intensity because of removal of large numbers of livestock from the region. Drought injury to the grassland evidently was not as severe in western North Dakota as it was in Montana and the central and southern Great Plains region, apparently due to removal of livestock.

Grassland vegetation was severely injured by the drought years of 1934 and 1936. Of six major species making up about 85 percent of the cover, blue grama was reduced in density by about 64 percent, needle-and-thread 53, western wheatgrass 67, and prairie junegrass 33 percent. Threadleaf sedge was not reduced in area occupied during drought years, and needle leaf sedge increased in abundance. Most minor grasses, except western bluegrass, were also reduced in abundance by the droughts. Little bluestem decreased in abundance by 74 percent and prairie sandgrass by 33 percent. The density of the range grassland as a whole was reduced from about 30 percent in 1933 to about 13 in 1936.

Recovery following the drought was comparatively rapid. Blue grama and western wheatgrass, the most severely injured major species, have about regained their predrought level, and other major species are even more abundant. Perennial forbs have also increased in abundance and in number of species found in the quadrats during the period as a whole. Annual forbs fluctuated widely, being almost totally absent during drought years and very abundant in the years immediately following.

[Farm crops research in Mississippi] (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *Nos. 4, pp. 2, 7; 5, pp. 1–2, 7, 8*).—Progress in research with different field crops and related work is reported in articles entitled:

No. 4.—Rates of Seeding Four Varieties of Soybeans for Hay, by H. A. York (p. 2); Increased Yields of Lespedeza Seed and Hay Follow Phosphate and Lime Treatment, by J. L. Anthony (p. 2); and 16- to 22-Inch Spacing of Corn in Drill for Grain, 10-Inch for Silage, Shown in Delta, by P. W. Gull (p. 7).

No. 5.—Side-Dressing Fertilizers for Cotton, Corn, by W. B. Andrews (pp. 1, 8); Corn, Cotton Outlook More Favorable, Truck Crops Poor as Growing Weather Begins (p. 1); Soil Fertility Practices for Maximum Yields of Cotton and Corn in the Delta (p. 2), and Good Legume Crop Furnishes Needed Supply of Nitrogen (p. 8), both by R. Kuykendall and J. Pitner; Each Pound of Actual Nitrogen Applied Increases Yield of Corn by Half-Bushel, by R. Coleman (p. 7); and Clover Seed Crop Valuable, and Needed To Supply War Scarcity; Harvest Methods Listed, by H. W. Bennett (p. 8).

Varieties of farm crops for Montana, 1943 (*Montana Sta. Cir. 171* (*1943*), *pp. 19*).—Varieties of hard red spring and winter wheat, oats, barley, flax, rye, alfalfa, clover, sweetclover, grasses, field beans, corn, and corn hybrids recommended for the State are listed with regional adaptations and in order of preference and are described. Certain varieties not recommended are also mentioned.

[Crop experiments in North Carolina] (*Res. and Farming* [*North Carolina Sta.*], *1* (*1943*), *Prog. Rpt. 2, pp. 1–2, 4, 11, illus. 1*).—Findings in current research are noted in brief articles entitled Realizing Greater Returns From North Carolina Permanent Pastures, by R. L. Lovvorn (pp. 1, 2); Borax Remedies Cracking of Sweet Potatoes, by L. G. Willis (p. 4); and Fertilizing Peanuts for Oil (p. 11).

Alfalfa in eastern Washington, A. G. Law. (Coop. U. S. D. A.). (*Washington Sta. V Cir. 7* (*1943*), *pp. 4*).—Timely advice on the choice of alfalfa varieties, cultural and management methods, and haying and pasture practices.

The temperature factor in fertilization and growth of the barley ovule, M. N. Pope. (U. S. D. A.). (*Jour. Agr. Res.* [*U. S.*], *66* (*1943*), *No. 11, pp. 389–402, illus. 8*).—In hand-pollinated Manchuria barley (*Hordeum vulgare pallidum*), grown at constant temperatures for 6 days in the greenhouse, pollen tube growth was most rapid at 30° and 35° C. where male nuclei were present in the egg sac 20 min. after pollination, while at 5°, 140 min. were needed to reach this stage. Nuclear divisions occurred about three times as often in the endosperm as in the embryo. Optimal growth of both endosperm and embryo appeared to be around 30° (86° F.). Growth is less rapid at 35° C. and death occurs at 40°. Between 10° and 30° growth, as measured by number of generations in endosperm and embryo, conformed to Van't Hoff's rule on the relation of velocity of reaction to temperature.

Coastal Bermuda grass, G. W. Burton. (Coop. U. S. D. A. and Ga. Expt. Sta.). (*Georgia Coastal Plain Sta. Cir. 10* (*1943*), *pp. 10+, illus. 2*).—Coastal Bermuda grass, derived as a natural hybrid between Tift Bermuda (E. S. R., 86, p. 470) and possibly a tall-growing strain of Bermuda from the Union of South Africa, has larger stems, stolons, and rhizomes and longer leaves and internodes, is more tolerant to cold and to *Helminthosporium* leaf spot than common Bermuda grass, and is larger and much more erect in growth than

Tift Bermuda. It produces very few seed heads and these rarely contain viable seed. Soil and planting needs and uses of Coastal Bermuda for pasture and hay are described briefly, and the comparative composition of common, Tift, and Coastal Bermuda grasses, as determined by T. S. Boggess, [Jr.], is tabulated.

Castor beans—an industrial war crop, R. F. Fuelleman and W. L. Burlison. (Ill. Expt. Sta.). (*Seed World, 53 (1943), No. 8, pp. 12–13, illus. 4*).—Production practices and varieties are described.

Hybrid corn in Wyoming, 1942, W. A. Riedl and W. L. Quayle (*Wyoming Sta. Bul. 261 (1943), pp. 20*).—Under irrigation, as at Torrington, a number of hybrids (E. S. R., 87, p. 508) made increases over the local variety in yields of well-matured grain, the greatest acre increase being 11.94 bu., which was the smallest difference in 4 years' tests. Several semilate and late hybrids produced significant increases of green forage and of dry forage. A number of hybrids, 1939–42, averaged more than 100 bu. per acre, the highest average increase over the local variety being 20.2 bu. On dry land at Gillette and Sheridan, several hybrids gave small increases over Falconer, but none equaled its respective 3-yr. average yield or 2-yr. average yield at these places. Results at Riverton indicated that several hybrids in the medium group were worthy of further test. At Laramie a number of hybrids made greater yields of green and dry forage than did the local variety.

Advancing the flax front, H. L. Walster (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 5, pp. 2–11, illus. 2*).—A résumé of current results and accomplishments of research with flax at the station dealing with yields and production in North Dakota, varieties, flax wilt and rust, chemistry of flaxseed, and economic investigations.

Spinning flax for bags on cotton mill machinery (*Cotton, 107 (1943), No. 6, pp. 75–78, illus. 2*).—Continued studies (E. S. R., 86, p. 618) at the Georgia Engineering Experiment Station indicated that seed flax appears to offer more possibilities of farm profit than fiber flax because of much lower harvesting costs and higher seed yield. The tank-retting and decorticating process may be the better basis for the eventual establishment of a flax industry. The more pressing textile needs which seed flax fiber satisfy are raw sugar bagging and other types of bagging, twine, cordage, and nontextile uses. Segregating the long and short fibers on a French worsted comber makes it possible to spin 100-percent flax yarns of finer counts from the longer fibers on cotton machinery. Thus far 5s (cotton count) are the finest produced in the pilot plant. The short fibers from the segregation can be used in toweling in mixture with cotton. Fabrics of 75 percent flax can be consistently spun up to 14s and 50 percent flax has been spun as fine as 20s. While the chemical degumming process has definite possiblities, thus far the cost of producing degummed fiber appears too high to create enough textile interest to justify attempting an agricultural development based on this process. Mill experience derived from the retted-decorticated and refined fiber, it is believed, may ultimately lead to the solution of spinning fine yarns from this type of fiber.

Peanut production, E. T. Batten (*Virginia Sta. Bul. 348 (1943), pp. 15*).—Practical instructions on growing peanuts in Virginia, based extensively on research at the Nansemond County Substation, consider the status and uses of the crop, soils and their preparation, use of fertilizers and lime, rotations, varieties, seed and planting, cultivation, harvesting and picking, and the control of insects and diseases.

Growing potatoes in Missouri, A. D. Hibbard (*Missouri Sta. Bul. 464 (1943), pp. 23, illus. 8*).—Cultural methods and field and harvest practices involved in producing potatoes in Missouri, described and illustrated, include soil management—rotation, fertilizers, and preparation; varieties; seed and its treatment; planting and cultivation; control of insects and diseases; harvesting; storage; and marketing.

Growing potatoes for home use, A. D. Hibbard (*Missouri Sta. Cir. 258* (*1943*), *pp.* [*4*]).—Practical instructions on varieties, cultural and field practices, insect and disease control, and harvesting and storage.

Rice fertilization, M. Nelson (*Arkansas Sta. Bul. 430* (*1943*), *pp. 23*).—Experiments at the Rice Substation dealt with the possibility of profitable returns by fertilization methods other than direct application to rice at time of seeding. Significant increases, 1931–40, resulted from a 4–8–4 fertilizer applied 6 and 8 weeks after seeding and 6 weeks after seeding plus lime applied 2 weeks before seeding, i. e., 10.6, 9.1, and 5.7 bu. per acre, respectively. N alone from ammonium sulfate returned significant increases, 3.7–5.7 bu. per acre, when applied on five dates from 4 weeks before to 10 weeks after seeding, without marked preference for any one time. An average increase in yield of 9.4 bu. was returned by a 4–5–4 fertilizer from Ammo-Phos and potassium sulfate applied 6 weeks after seeding. Ten tons of manure per acre before seeding produced an increase in rice yield of only 2.6 bu. Lime alone or with fertilizers did not consistently affect yields, and in general yields with fertilizer alone were larger than when lime also was added. A 4–8–4 fertilizer added 4 weeks or longer after seeding on farms returned significant yield increases in five tests, 1938–39. Results from sodium nitrate, ammonium sulfate, and cyanamide varied, but significant increases resulted in about half of the tests.

When corn was the dry-land crop, significant increases in corn yields came from complete fertilizers, a mixture of ammonium and potassium sulfates, and from potassium sulfate, but the increases usually were not profitable. Residual effects of complete fertilizers upon rice yields were negligible, although significant increases in rice yields, from 5.3 to 4.3 bu. per acre, were residual effects from cyanamide, sodium nitrate, Ammo-Phos, and a mixture of sulfates of ammonium and potassium. These returns would hardly cover the cost of fertilizers applied to corn. Use of 500 lb. per acre of 4–8–4 fertilizer returned increases in yields of soybeans, cotton, and corn preceding rice, but residual effects on rice were inconsistent. Residual effects of fertilizers applied to preceding crops evidently cannot be relied upon to produce increased rice yields. Fertilizers produced larger rice yields only when applied by a direct method.

The outlook for waxy sorghum in Nebraska, R. L. Cushing. (Coop. U. S. D. A.). (*Nebraska Sta. Cir. 73* (*1943*), *pp. 4*).—Reporting on the current situation of the use of waxy sorghum grain for manufacture of special starches, the station essentially repeats for 1943 its 1942 recommendations (E. S. R., 88, p. 475). Among the many factors expected to influence the future Leoti sorgo situation are the possibility that waxy corn may satisfy some of the demand, the development of waxy sorghum varieties superior in several respects to Leoti, the shortage of good Leoti seed, the possibility that other crops will be more attractive to the farmer, and the remote possibility that sufficient shipping space will become available to import tapioca starch from Brazil.

Edible soybeans for Oklahoma: 1942 variety tests and notes on use and culture, H. W. Staten (*Oklahoma Sta. Cir. 107* (*1943*), *pp. 8*, *illus. 1*).—The most promising of the edible soybean varieties and strains tested in 1942 are the Rokuson, Bansei, Hahto, Osayu, Higan, Aoda, Emperor Edible, Hokaido, Imperial Edible, and Jogun. Their general characteristics are tabulated, and cultural and harvesting practices are outlined.

Tift Sudan, G. W. Burton. (Coop. U. S. D. A. and Ga. Expt. Sta.). (*Georgia Coastal Plain Sta. Cir. 11 (1943), pp. 14, illus. 2*).—Tift Sudan, selected from backcrosses of F_2 Sudan × Leoti sorgo to superior Sudan selections, has vegetative characters of Sudan and the resistance of Leoti to foliage diseases. Tift Sudan tends to tiller and develop side branches from each stem to a greater degree than common Sudan, and its panicles are smaller and more compact. Cooperating in multiplying seed of this strain, R. E. Karper, Texas Experiment Station, finds that Tift Sudan yields about 75 percent as much seed per acre as the old type. Reports from cooperators are given on regional adaptation, disease resistance, productivity, and HCN content, and remarks are made on planting methods, use for hay and pasture, pasture management, and on Tift Sudan v. pearl millet for cattle in the Coastal Plain.

Sweetpotato production: Time of planting and hill spacing studies, W. S. Anderson and J. W. Randolph. (Coop. U. S. D. A.). (*Mississippi Sta. Bul. 378 (1943), pp. 22, illus. 2; abr. in Miss. Farm Res.* [*Mississippi Sta.*], *6 (1943), No. 4, pp. 1, 3–6, illus. 2*).—Porto Rico and Triumph sweetpotatoes were planted on farms near Laurel on Cahaba, Kalmia, and Ruston fine sandy loams in 1940, 1941, and 1942, respectively, at 8-, 12-, 16-, 24-, 32-, and 42-in. spacings with April 15–25, May 8–14, May 27–June 4, June 14–23, and June 28–July 13 planting dates. Delaying time of planting and widening the hill spacing, in general, caused the total and No. 1 yields to be gradually reduced. Estimated net profits per acre also were lower with delay in time of planting and as the spacing was wider than 24 in., assuming mule or tractor equipment methods. The highest total yield and greatest net profit per acre for Triumph came from April planting and spacings of from 16 to 24 in. and for Porto Rico (No. 1's) from April planting and 16-in. spacing. Triumph made its greatest yield and highest money return per man-hour from April planting and 24-in. spacing with mule equipment and 32-in. spacing with tractor equipment. Effects on shape and on contents of carotene and starch are also noted. Sweetpotatoes evidently should be planted as early as plants are available after the average frost-free date. Porto Rico grown for food should be spaced about 12-16 in. apart, while Triumph for starch or feed should be spaced about 24 in. when planted by May 15 and about 16 in. when planted after that date. See also earlier notes (E. S. R., 85, p. 550; 87, p. 370).

Tobacco Substation at Windsor, report for 1942, P. J. Anderson, T. R. Swanback, and S. B. LeCompte, Jr. (*Connecticut* [*New Haven*] *Sta. Bul. 469 (1943), pp. 97–155, illus. 10*).—Cigar-leaf tobacco experiments (E. S. R., 87, p. 796) reported on were concerned with fertilizer placement, poultry manure, mutations, and black tobacco. The incidence and control of diseases is noted on page 457 of this issue.

Placement of fertilizer for tobacco, T. R. Swanback (pp. 103–105).—Fertilizer applied, 1940–42, at planting gave better returns than that applied 10 days before, and fertilizer in bands on each side of the row made better yields and grading than that broadcast. Comparison of 1,875, 2,188, and 2,500 lb. per acre of 8–4–8 showed that if the amount applied per acre is reduced by one-fourth, the acre return value is reduced by more than 12 percent, and reducing the amount by one-eighth decreased the value by 9 percent, the reduction being due to both lower yields and grading. Saving in fertilizers beyond the generally established norm for tobacco in the Connecticut Valley (N 200 lb., phosphoric acid 100, and potash 200 lb. per acre), without reduction in yield and quality, is apparently not feasible, even by row application. Row application, however, saves time and labor as fertilization and planting are done simultaneously, makes the grower more independent of weather, and results in a more even distribution of plant food.

Poultry manure as a tobacco fertilizer (pp. 105–106).—Tobacco in 1942 receiving 10 tons per acre of fresh chicken manure plus 300 lb. of cotton-hull ash resembled that receiving 2,500 lb. per acre of 8-4-8 plus 700 lb. of bonemeal in growth, yield, and grade index, but fire-holding capacity averaged 31.3 and 38.7 sec., respectively.

Giant Broadleaf (pp. 129-130).—Giant mutants, a typical case of gigantism appearing in fields of Broadleaf in 1942, are described.

Studies on black tobacco.—II, Field crop response to phosphate and lime fertilization, S. B. LeCompte, Jr. (pp. 130-155).—Effects of 48 percent superphosphate and hydrated lime upon quality, value, yield, and plant development of field-grown shade tobacco, with special reference to black tobacco (E. S. R., 85, p. 760), were studied on new land, i. e., fallow for a long time or woodland shortly before tobacco culture, of Merrimac fine sandy (A) and Merrimac sandy (B) loam and strongly acid and deficient in P and Ca when tobacco culture was begun in 1939. Black tobacco was abundant in 1939 and 1940.

Both treatments resulted in considerable plant response on field A in 1941 and 1942 but only slight response in 1941 on field B, which, prior to the experiments, had received much more phosphate and lime. The highest crop values on field A after a 2-yr. period were achieved with 192 lb. per acre P_2O_5 added each year to the usual tobacco fertilizer. Satisfactory quality was not obtained in shade tobacco from new land until P_2O_5 totaling about 800 lb. per acre had been applied. In the second season on field A, plats limed in 1941 produced little black tobacco in contrast to the high proportion of black leaf from untreated plats. Plats treated with lime alone plus the usual fertilizer produced low crop value, however, and poor growth was evident in 1942 on plats treated in 1941 with 1,226 lb. CaO.

Analysis showed that, on any particular plat, as leaf color-grade was darker, the greater were foliar Fe and Mn at any level on the stalk. Leaves containing more than Fe 0.16 and Mn 0.03 percent (dry weight basis) were black and of very inferior quality. Fe and Mn were generally more abundant in leaf than in stalk per unit weight of dry matter. Generally the greatest foliar concentration of Fe and Mn was found below the seventh node. In tobacco, 95 days after setting and studied at about nodes 1, 8, and 14, stalks were richest in Fe in the basal section and in Mn at about node 14. Fe concentration at about node 8 was rather similar in all samples from 10 plats with widely differing fertility. The average ratio of Fe to Mn from good plats, all four pickings taken together, was roughly twice the Fe : Mn ratio in tissue from poor plats, but no definite value or range of values of the ratio appeared to characterize a definite commercial leaf grade. Practical recommendations are made.

Spring wheat for 1943, S. P. Swenson, O. E. Barbee, O. A. Vogel, H. Jacquot, and I. M. Ingham. (Coop. U. S. D. A.). (*Washington Sta. V Cir. 4 (1943), pp. 4*).—Varietal recommendations (Federation, Baart, Onas, and Idaed), sources of seed, and seedbed preparation are discussed in relation to the efficient production of spring wheat.

The effect of temperature and humidity on viability of stored seeds in Hawaii, E. K. Akamine (*Hawaii Sta. Bul. 90 (1943), pp. 23, illus. 6*).—Germination tests on seeds of corn, soybean, alfalfa, rice, garden bean, lettuce, and *Pennisetum ciliare* stored for different periods and under varied conditions, 1936-41, revealed that seeds of different species, although showing similar trends, reacted somewhat differently toward storage conditions. Longevity, in general, was maintained well at relative humidities of at least 20 percent below that of the normal air (64-73 percent) even at prevailing room temperatures of about 71°-80° F. Relative humidities between 15 and 45 percent provided excellent storage atmospheres. Seed remained viable equally well at temperatures of at least 25° below that of the normal air even without humidity control. From 45° to 50° are excellent storage temperatures. In the ideal storage condition both relative humidity and temperature are kept low. Storage of air-dried seeds in airtight containers under the high humidity conditions generally prevailing in Honolulu was detrimental to viability at all temperatures. Maintenance of viability is influenced by the moisture content of the seed, which is in turn determined by the humidity of the storage medium. A recommendation is that insect-free, well-cured crop seeds in Hawaii be stored either in cold storage or in a very dry atmosphere at room temperature.

Seed inspection, F. A. McLaughlin (*Massachusetts Sta. Control Ser. Bul. 115 (1942), pp. 94*).—Germinations, purity, and weed seed contents are tabulated for official samples of field crops seed and mixtures and germination for samples of vegetable seed collected in Massachusetts during the year ended November 1, 1942. Results are also reported of field tests for trueness to type and variety on lots of beets, carrots, rutabaga, and turnip, in cooperation with G. B. Snyder, and from studies of flower seeds, in cooperation with C. L. Thayer, including tests for germination and performance.

Testing seeds is good insurance, W. O. Whitcomb (*Montana Sta. War Cir. 3 [1943], pp. [4]. illus. 1*).—Remarks on the advantages of tested farm crops seeds, label information, and on how to send seeds to the Montana grain inspection laboratory for tests.

Weeds: Publications of the North Dakota Agricultural Experiment Station on weeds, O. A. Stevens (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 5, pp. 30–35*).—A chronological list including 121 titles.

The effectiveness of borax and sodium chlorate-borax combinations for the control of perennial weeds, S. C. Litzenberger (*Montana Sta. War Cir. 2 [1943], pp. 11*).—Borax and borax-sodium chlorate were broadcast dry in herbicide experiments in different localities in Montana, 1940–41. Yellow toadflax and St. Johnswort could be controlled effectively by treatment with 7 and 8 lb. of borax, respectively, without detrimental effects on remaining stands of grass. For species more tolerant to B, the most economical combination is sodium chlorate 2 lb. and borax 6 lb. per square rod to control Canada thistle, bindweed, Russian knapweed, and quackgrass, and 2 and 10 lb., respectively, for leafy spurge. Whitetop was not controlled satisfactorily with these chemicals. Borax was more effective on porous, light soils receiving enough precipitation to leach it into the soil to a depth of the main root system by the time the roots were active in the spring. Burning the weed before treating also increased effectiveness of the treatments.

Eradication and control of nut grass, C. H. Davis and R. S. Hawkins (*Arizona Sta. Bul. 189 (1943), pp. 20+, illus. 2*).—Nutgrass (*Cyperus rotundus*) control by cultural and chemical treatments was studied, 1937–41, and considerable attention given to response of the weed to soil moisture differences, especially inability of tubers to withstand drying on the soil surface, as shown by Smith and Fick (E. S. R., 79, p. 190).

Drying the tubers by bringing them within a few inches of the surface through successively deeper plowings at intervals of from 2 to 3 weeks during the hot months, followed immediately by a sorghum smother crop, successfully controlled nutgrass in fields at Tucson and Mesa. The soil must be kept dry during the plowing treatments. Two or three hoeings in the sorghum row usually will hasten eradication very materially. Weekly cuttings, it was found, will kill the weeds in moist soil. Continuous cultivation, a practical method of eradication from permanent plantings, must be carried on for three seasons to kill all the weeds around the trees or vines. A smother crop and early-season cultivation might be combined in some orchards. Irrigation each month with weekly cultivation was the most practical method of killing nutgrass where no crops were to be grown. A cultivator with sharp sweeps, a good disk, or a hand hoe, in order, were the most effective implements. No season of starting cultivation showed any advantage over others in reducing the time or number of cultivations needed for eradication. Chemicals failed to give satisfactory control of nutgrass. Data are included on vertical distribution of the tubers in the soil, germination after burial at different depths, and damage to growing sorghums. Eradication and control practices are outlined.

Controlling white top on irrigated farms, W. A. Harvey (*Washington Sta. V Cir. 5* (*1943*), *pp. 4*).—Practical considerations on the cropping of whitetop infested land, including the growing of cultivated crops, such as corn and sugar beets, and smother crops, such as alfalfa.

HORTICULTURE

Influence of varied soil reactions on growth and yield of vegetable crops on Newtonia silt loam and Ruston fine sandy loam soils, V. M. Watts and J. R. Cooper (*Arkansas Sta. Bul. 433* (*1943*), *pp. 32*).—Experiments conducted at Fayetteville and at Hope with several vegetable crops indicated that all the species under trial except the watermelon produce their highest yields when the soil reaction is pH 6.5 or higher. The watermelon produced moderately good yields on soils with reactions as low as pH 5.0. Maximum yields of all crops grown at Fayetteville (Newtonia silt loam) and four of the eight crops grown at Hope (Ruston fine sandy loam) were produced on plats with neutral or slightly alkaline reactions. The yields of only two crops, potatoes and sweetpotatoes, grown on the Ruston soil were significantly reduced by any degree of soil alkalinity. The results of determinations of plant content of nitrate N, soluble P, and K in tomatoes grown on the Newtonia silt loam showed that both nitrate N and soluble P are limited in plants grown on soils of reactions below pH 6.0. The K content of plants was apparently unaffected by soil reaction within the limits used. Since the plants in the most acid lots assumed a dark purplish green color typical of P starvation, the authors suggest that P deficiency rather than N deficiency caused the reduction in growth. Except for the cucumber, where damping-off was serious in soils above pH 6.0, germination of seed was uniform at all the reactions used. Seedlings, on the other hand, responded markedly in their development to the pH level.

The home vegetable garden, C. H. Nissley (*New Jersey Stas. Cir. 458* (*1943*), *pp. 25+*, *illus. 12*).—General information is offered on the planting of the vegetable garden, propagation of plants, preparing and fertilizing the soil, culture, protection from insects and disease, and the storage of vegetables. Specific information is presented on the culture of various crops, including strawberries.

Home gardening in Hawaii, W. A. Frazier (*Hawaii Sta. Bul. 91* (*1943*), *pp. 115+*, *illus. 66*).—General information is presented on garden planning and management; soils, manures, and fertilizers; selection and planting of seed; handling of transplants; disease and insect control; and specific requirements of various garden crops. Appended in tabular form is information on the nutritive values of vegetables, temperature requirements, etc.

A select list of varieties of fruits and vegetables, B. D. Drain (*Tennessee Sta. Cir. 84* (*1943*), *pp. 8*).—This supersedes Circular 27 (E. S. R., 62, p. 738). Annotated lists are presented of the desirable varieties of fruits and vegetables, accompanied by brief suggestions as to important characteristics and usefulness.

Spinach varieties, H. Drewes (*Michigan Sta. Spec. Bul. 225, rev.* (*1943*), *pp. 47*, *illus. 26*).—This revision of an earlier bulletin (E. S. R., 68, p. 45) broadens the scope of the earlier paper by including several new varieties. The data on the individual varieties embraces information on the history, synonyms, season, long-standing qualities, growth characteristics, uses, etc.

Inhibiting influence of the leaves on the photoperiodic response of Nobel spinach, A. P. and R. B. Withrow and J. P. Biebel. Ind. Expt. Sta.). (*Plant Physiol., 18 (1943), No. 2, pp. 294+298, illus. 2*).—The bud of the Nobel spinach was found to be relatively insensitive to photoperiod, suggesting that the phasic development of the bud is controlled largely by the reaction in the leaves. No flower bud primordia were found at the end of the treatment when only one leaf on a plant was exposed to a long photoperiod. When three leaves were exposed, microscopic examinations showed that 70 percent of the plants had flower primordia. When all the leaves were exposed, all the plants had buds in 17 days, with the first visible in 12 days. Leaves kept in an unfavorable short photoperiod exerted an inhibiting influence on flower bud initiation and development in this variety.

Starter solutions for tomato plants for 1943, C. B. Sayre (*New York State Sta. Bul. 706 (1943), pp. 18, illus. 3*).—The elimination of certain fertilizer materials as a result of war demands made necessary a greenhouse trial in the winter of 1943 of the relative effectiveness of available materials as starter solutions for transplanting tomato plants. Each of 23 treatments was tested on an acid soil (pH 4.8) and a neutral soil (pH 7.2). The starter solutions were applied when the plants were transplanted to the soil, and the effectiveness of the various treatments was judged 23 days later. The results suggested that very satisfactory starter solutions may be made with some grades of available mixed fertilizers. Of these grades 4–16–4, 4–10–5, and 4–10–10 proved most satisfactory, and 3–12–6 fairly satisfactory. The 4–16–4 grade was apparently the best. All of these grades should be used at the rate of 10 lb. to 50 gal. of water, with ¼ pt. per plant. Mixed fertilizers containing ammoniated superphosphate were less acid and more satisfactory than mixtures of superphosphate and sulfate of ammonia. High-analysis, special transplanting mixtures have an advantage because of less insoluble residues, but are relatively unavailable under present conditions. Nitrate of soda alone and superphosphate alone made poor starter solutions, but when combined were effective. Nutrients applied to the foliage were not nearly as effective as when poured around the roots. A comparison of the greenhouse results with those obtained in the field the preceding summer suggested the reliability of greenhouse tests for forecasting the usefulness of materials as starter solutions.

Growing tomatoes for home use, T. J. Talbert and A. D. Hibbard (*Missouri Sta. Cir. 266 (1943), pp. [4]*).—Brief information is presented on varieties, soil selection, use of stable manures and commercial fertilizers, planting operations, cultivation, mulching, and disease and insect control.

Greater production of tomatoes for canning, C. H. Mahoney and H. A. Hunter (*Maryland Sta. Pop. Bul. 1 (1942), pp. 12+, illus. 1*).—General information is offered on soil selection; crop rotations; use of lime, fertilizers, and stable manure on different types of soil; varieties; plant production; transplanting and field culture; and control from insect and fungus pests.

Edible wild plants, O. A. Stevens (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 5, pp. 11–15, illus. 4*).—Information is presented on the edibility and comparative desirability of certain species such as wild mustard, lambsquarters, dandelion, prairie turnip, milkweed, camas, and wild onion.

Some methods for approximate prediction of surface area of fruits, W. D. Baten and R. E. Marshall. (Mich. Expt. Sta.). (*Jour. Agr. Res. [U. S.], 66 (1943), No. 10, pp. 357–373, illus. 7*).—Surface areas of samples of Jonathan, McIntosh, Delicious, Stayman Winesap, Wagener, Gravenstein, Chenango, and Grimes Golden apples were obtained by removing the peel in narrow strips and using a planimeter for securing the areas of these strips. Linear relations, predicting equations, and standard errors of estimate were determined for planimeter surface areas of apples and each of the following measurements: Areas of transverse cross sections, areas of axial or longitudinal cross sections, transverse diameters, axial or longitudinal diameters, and weights of fruits. The most practical predicting equation of those studied for approximate surface areas of harvested apples is based on weights of fruits, and the most suitable one for use on unpicked apples is based on transverse diameter of apples. An average predicting equation may be used for several varieties of the same kind of fruit with standard error of estimate nearly as small as the standard error of estimate for an equation based on a single variety. There appears to be a rather constant relationship between surface areas and weights of apples during the several weeks prior to maturity.

A study of surface area and weight measurements on Anjou, Bosc, and Bartlett pears and on Monarch and Pond plums suggested that weights of pears and of plums may be used, respectively, for predicting surface areas of these fruits. A method is presented for determining which of two variables is better to use for predicting a third variable.

The Redhaven peach (*Michigan Sta. Rpt. 1942, p. 116*).—Brief information is presented on a new variety of peach produced in a cross of Halehaven × Kalhaven. Firm, golden-fleshed, thick-skinned, and freestone, the new variety ripens about 30 days before Elberta at a time when prices are generally high.

A developmental analysis of the strawberry fruit, A. L. Havis. (Ohio Expt. Sta.). (*Amer. Jour. Bot., 30 (1943), No. 4, pp. 311–314, illus. 4*).—In studies with four varieties of strawberry, Howard 17, Aberdeen, Blakemore, and Catskill, the pith and cortex tissues of the fruits were found to grow at approximately the same relative rates in all four varieties. The cortex developed more rapidly than the pith and at a more rapid relative rate than the fruit as a whole. Cell division occurred in the pith throughout the developmental period of the study, namely, from about 12 days before anthesis to fruit maturity. In the cortex most cell division ceased shortly before anthesis. An increasingly large proportion of the volume of both the pith and cortex was due to cell enlargement as maturity approached.

Effect of fertilizers on orange yields, E. R. Parker and L. D. Batchelor (*California Sta. Bul. 673 (1942), pp. 39, illus. 6*).—The results of six trials with orange trees conducted on different types of soil are summarized. The primary deficient elements in these trials were nitrogen and zinc. Organic matter deficiency was also noted on certain of the soils. At Riverside large yield responses were obtained from the use of nitrogenous materials, and various inorganic and organic materials were equally effective as sources of N. Yield gains were obtained also from organic matter in the form of cover crops or bulky organic fertilizers. The response to Zn was particularly noticeable where organic materials were not used. Spring applications of manure as the sole fertilizer depressed yields when the total amount of applied N was small. The results indicated that the carbon : nitrogen ratio of the fertilizer materials is important when the supply of available N in the soil is low. No response was obtained from applications of phosphate, K, gypsum, limestone, or S. Similar results were obtained in the other five experiments. In two trials in which Sudan grass was grown just before and during the ripening of Washington Navel oranges, the development of color was hastened but the surfaces of the fruit were rougher than usual. The soluble solids : acid ratio of the juice was not affected.

There are evidently many ways in which N and organic matter may be supplied to orchards. Satisfactory N materials included the common organic and inorganic fertilizers, nitrate of soda, nitrate of lime, sulfate of ammonia, urea, dried blood, cottonseed meal, and also bulky materials such as manure, alfalfa hay, cereal straw, and bean straw. There was a need for supplementing bulky materials with N concentrates where the content of N in the soil was relatively low. Cover crops were satisfactory sources of organic matter and may, under favorable conditions, supply all that is needed. No evidence was obtained in any of the six trials that P or K is necessary, it being evident that the California soils used for citrus are initially relatively well supplied with these two elements.

The outlook for plantation rubber in tropical America, E. W. Brandes. (U. S. D. A.). (*Chron. Bot., 7 (1943), No. 7, pp. 320–323*).

Breeding snapdragons for resistance to rust, H. E. White (*Massachusetts Sta. Bul. 400 (1943), pp. 16, illus. 2*).—Breeding work with snapdragons was initiated with a view to developing strains with greater resistance to rust than possessed by commercial varieties. Improved strains, highly resistant to rust, were obtained from crosses between greenhouse forcing strains and rust-resistant strains developed by the Indiana Experiment Station. Resistance was determined to be inherited as a simple dominant hereditary factor. A modified dominant type of resistance was observed in the progeny from crosses between susceptible commercial varieties. Rust-resistant strains were developed with an inherited resistance of from 80 to 90 percent. These hybrids, ranging in color from white to pink, yellow, and orange yellow, and possessing a vigorous habit of growth, are suitable for greenhouse culture. No heritable differences in resistance to *Verticillium* wilt, mildew, or anthracnose were observed in the hybrids. Among 56 wild species and strains of *Antirrhinum* tested for reaction to rust, *A. charidemi*, *A. calycinum*, *A. ibanjezi*, *A. siculum*, and four strains of *A. glutinosum* were most resistant. Plants propagated from cuttings proved resistant to rust for three seasons in field and greenhouse tests. No physiologic races of the rust fungus were observed on the resistant hybrids under trial.

FORESTRY

Some problems and possibilities in forest tree physiology, P. J. Kramer (Chron. Bot., 7 (1943), No. 7, pp. 296–297).—A brief discussion, with listing of several problems "to indicate more specifically a few of the many interesting possibilities in this field."

Transpiration rates of some forest tree species during the dormant season, T. T. Kozlowski (*Plant Physiol., 18 (1943), No. 2, pp. 252–260, illus. 2*).—Absolute transpiration rates were determined during the winter of 1940–41 at Durham, N. C., for six species, loblolly and eastern white pine, cherry laurel, white oak, yellow poplar, and sugar maple. No great differences were observed in the foliar transpiration of conifers and stem transpiration of deciduous species on a unit area basis. A decrease in soil temperature was found to decrease the transpiration rates of loblolly and eastern white pines, and over the range of 17°–0° C. the transpiration of loblolly pine was reduced more than that of white pine. The greater reduction in absorption by loblolly pine in cold soils is believed to be a factor in its inability to survive in colder regions.

Amount and duration of growth of various species of tree seedlings, P. J. Kramer (*Plant Physiol., 18 (1943), No. 2, pp. 239–251, illus. 4*).—Measurements taken throughout the growing period on seedlings of 11 forest species growing in a single plat at Durham, N. C., showed considerable differences with respect to the duration of the growth period and the time of maximum growth. All species began growth at about the same time in spring, but some completed growth much earlier than others. White ash, eastern red oak, white oak, and black walnut ceased growing in July or early August, while yellow poplar continued at about the same rate until September. Among the conifers, loblolly, shortleaf, and slash pines continued growth into October, whereas red and white pines completed growth in July or early August. Actually certain of the species used only one-half to three-fourths of the frost-free period. Of five hardwoods, white ash and yellow poplar grew most rapidly and made over twice the growth of the two oaks and the black walnut. Among the conifers, loblolly pine grew outstandingly. In fact, the two northern pines, red and white, made only one-sixth the growth of the loblolly pine. Day length is considered a factor in checking the growth of some species, but is apparently not the only factor concerned.

Mycorrhizae and phosphorus nutrition of pine seedlings in a prairie soil nursery, A. L. McComb (*Iowa Sta. Res. Bul. 314 (1943), pp. 581–612, illus. 10*).—Pine seedlings growing on O'Neil sandy loam which had been used for general agricultural crops failed to grow unless the roots developed mycorhizas. Inoculation was obtained by applications of duff and humus from a vigorous pine plantation. In the Virginia pine, plants with mycorhizas had much larger root systems and more and larger absorbing root tips than those without mycorhizas. Analyses of seedlings showed that on a percentage dry-weight basis mycorhizal plants absorbed twice as much P as did nonmycorhizal plants, while there was no difference in the absorption of N and K. In fertilizer experiments on uninoculated soil, jack pine and other conifers grew well following the P fertilization, with little or no response from N. Growth following P fertilization was approximately equal to that obtained when unfertilized soil was inoculated properly. The author suggests that two species of fungi may be involved in the formation of mycorhizas on white pine and that one of these species may have been subdominant and incapable of forming mycorhizas without P treatment. Jack pine was found to be mycorhizal and to make satisfactory growth when grown on two forest soils taken from oak-hickory stands. Jack pine failed when planted in an alkaline prairie soil of the Webster series. It is suggested that the failure of nonmycorhizal pines on the O'Neil soil may have been due to a low level of root respiration, and that root respiration and activity may be stimulated by secretions from the mycorhizal fungi and by P.

Possibilities of cork oak in the Americas, M. A. Murray and E. N. Munns. (U. S. D. A.). (*Chron. Bot., 7 (1943), No. 7, pp. 323–327, illus. 1*).

DISEASES OF PLANTS

Plant pathology in Brazil, A. A. Bitancourt (*Chron. Bot., 7 (1943), No. 7, pp. 318–320*).—A brief survey of the subject, including plant pathological research centers, plant diseases and the agriculture of the country, and the problem of plant quarantine.

The Plant Disease Reporter, Index to Volume XXVI, 1942 (*U. S. Dept. Agr., Bur. Plant Indus., Soils, and Agr. Engin., Plant Disease Rptr., 26 (1943), No. 24, pp. 513–547*).—This index is by author and subject, which covers hosts, parasites, and common names of diseases and injuries.

Definitions of fungicide terms (*Phytopathology, 33 (1943), No. 7, pp. 624–626*).—A report by the Committee on Standardization of Fungicidal Tests.

A reflector scale for measuring growth of fungi, P. Hamm, J. E. Mitchell, and D. Gottlieb. (Minn. Expt. Sta.). (*Phytopathology, 33 (1943), No. 7, pp. 619–620, illus. 1*).

A culture medium of maize-meal and starch mush to replace agar for growing fungi, F. L. Wellman. (U. S. D. A.). (*Phytopathology, 33 (1943), No. 7, pp. 617–619, illus. 1*).—The formula presented proved satisfactory for *Alter-*

naria solani and *Fusarium bulbigenum lycopersici*, and other fungi as well as contaminating bacteria, and yeasts also have grown readily on it.

Freezing preservation of fungi and fungus spores, J. M. Hamilton and L. O. Weaver. (N. Y. State Expt. Sta.). (*Phytopathology, 33 (1943), No. 7, pp. 612–613, illus. 1*).—Viable sporidia were obtained for as long as 15 mo. after holding cedar galls with telial horns of *Gymnosporangium juniperi-virginianae* in paraffined Dixie cups at a temperature of —10° C. Stored at the same temperature, concentrated suspensions of conidia of *Venturia inaequalis* remained viable for over 15 mo. In this case, to prevent spores from settling to the bottom with the consequent dehydration, the cups are prepared with a layer of ice frozen in the bottom before the spore suspension is poured in. The procedure has also worked well with *Sclerotinia fructicola*, and comparable results have been reported for conidia of *Plasmopara viticola*.

Two new basidiomycetous fungi parasitic on nematodes, C. Drechsler. (U. S. D. A.). (*Jour. Wash. Acad. Sci., 33 (1943), No. 6, pp. 183–189, illus. 2*).—*Nematoctonus pachysporus* n. sp., destroying a nematode of the *Rhabditis monhystera* group, and *N. leptosporus* n. sp., parasitic on *Bunonema* sp., are described.

Composition of fungus hyphae.—IV, Phytophthora, R. C. Thomas. (Ohio Expt. Sta.). (*Ohio Jour. Sci., 43 (1943), No. 3, pp. 135–138*).—Study of nine species of *Phytophthora* indicated a basic skeleton of chitin with a mixture of two celluloses superimposed upon it, one being doubly refractive in polarized light and the other not. These were impregnated with fatty acids, which it was necessary to saponify with alcoholic potash before they could be removed by solution in ammoniacal cupric hydrate. The outer layer proved to be a carbohydrate mixture giving the orcinol-HCl test for pentoses. The presence of a hexose was also indicated, but no pectic compounds were found. Viewed in polarized light, the same appearance was presented by both young and old cultures of typical *Phythophthora* spp. This was in marked contrast to the *Pythium* spp. previously reported upon (E. S. R., 87, p. 349).

Annotated check list and host index of the rusts of Guatemala, G. B. Cummins. (Coop. Ind. Expt. Sta.). (*U. S. Dept. Agr., Bur. Plant Indus., Plant Disease Rptr., 1943, Sup. 142, pp. 79–131, illus. 1*).—In the present account 1,858 collections of rusts are cited, comprising 369 species on 611 hosts. Of the 1,858 specimens, P. C. Standley collected 742, E. W. D. Holway 600, K. F. Kellerman 243, J. R. Johnston 224, and all other collectors only 49.

Cellular changes in relation to rust resistance, F. S. Thatcher. (Minn. Expt. Sta.). (*Canad. Jour. Res., 21 (1943), No. 5, Sect. C, pp. 151–172, illus. 4*).—Associated studies of the histopathological development and permeability changes accompanying the browning reaction of Kubanka wheat to *Puccinia graminis tritici* race 34 indicated this reaction to be due to encystment of haustoria and brown discoloration of host cell walls. The reaction is accompanied by a progressive permeability increase of host cells to a degree that probably becomes fatal. Extremes of resistance and susceptibility manifest in the intermediate reaction were associated, respectively, with local decrease and increase of solute permeability of the host cell membrane. Cold hardening under some conditions caused a more vigorous development of rust and a slight lessening of resistance symptoms, actions possibly associated with a permeability increase induced by hardening. Hardening failed to alter appreciably the relative osmotic relationship of fungus and host. Infection of oats, barley, wheat, and corn with appropriate smuts did not change the degree of susceptibility to specific rusts. Evidence presented suggests that resistance of Hope wheat in the mature plant stage may be partly determined by lack of availability of water to the pathogens. Regional differences in susceptibility may possibly be explained in the same way. Vital histological examination of the development of resistant flecks on Vernal wheat demonstrated that host cells are killed prior to the occurrence of any discernible injury to fungus organs. The cause of the varying degrees of permeability change associated with different rust reactions is discussed.

Germination of grass smuts, L. A. Kolk (*Amer. Jour. Bot.*, *30* (*1943*), *No. 4*, *pp. 317–330*, *illus. 39*).—As a result of this study, the author describes in detail and illustrates the germination of seven smuts found on wild grasses, viz, *Ustilago underwoodii* on *Panicum virgatum; U. togata* and *Sorosporium syntherismae* on *P. dichotomiflorum; U. neglecta* on *Setaria lutescens; Sphacelotheca holci* on *Sorghum halepense; U. rabenhorstiana* on *Digitaria sanguinalis;* and *U. hypodytes* on species of *Stipa, Distichlis, Elymus*, and *Agropyron*.

A study of the genetics of Sorosporium syntherismae and Sphacelotheca panicimiliacei, W. J. Martin. (Minn. Expt. Sta.). (*Phytopathology*, *33* (*1943*), *No. 7*, *pp. 569–585*, *illus. 5*).—The life cycle and nuclear condition in these two fungi were found to be similar to those of most smuts previously studied, and much the same type of variation appears in both as occurs in other smuts attacking graminaceous crops. There are numerous biotypes within each species, and new biotypes result from mutation and hybridization. The collections of these two fungi studied by the author are considered to be definitely distinct species, differing in type of sorus as well as in size, arrangement, and markings of the chlamydospores. Intergrades between the two species, as reported by others, were not found, possibly because collections were not made over a sufficiently wide area. In cross-inoculations, *S. panici-miliacei* attacked only *Panicum miliaceum*, which agrees with reports in the literature, but it was demonstrated that *Sorosporium syntherismae* attacks both *P. miliaceum* and *P. capillare*.

Hybridization readily occurred between the two smut species under experimental conditions, some of which were apparently not far different from those that might occur in nature. The interspecific hybrid between *S. syntherismae* and *Sphacelotheca panici-miliacei* was more or less intermediate between the two parent species in many characters, including type of sorus, size of spores, markings of the spore walls, arrangement of the spores, time required for germination of the spores, and pathogenicity. Size of spores and markings of the spore walls are controlled by different factors, which appear to be inherited independently. The factor for verruculose spore walls behaves as a simple dominant over that for smooth spore walls. Fewer than 10 percent of the F_1 hybrid sporidia were viable, which has been reported also for other interspecific crosses in the smut fungi. The interspecific dicaryophytes produced in the study proved capable of attacking both *P. miliaceum* and *P. capillare*. Furthermore, there were marked differences in the pathogenicity of dicaryophytes arising from different interspecific combinations. Other investigators have emphasized the importance of interspecific, as well as intraspecific, hybridization in giving rise to new biotypes in the smut fungi.

The slide-germination method of evaluating protectant fungicides (*Phytopathology*, *33* (*1943*), *No. 7*, *pp. 627–632*).—A report by the Committee on Standardization of Fungicidal Tests.

The use of fungicides during war, G. L. McNew ([*Chicago: Canner Pub. Co.*, *1943*], *pp. 63+*, *illus. 34*).—This publication includes 13 articles previously published in *The Canner*, 12 of which have been noted (E. S. R., 89, p. 223), and a foreword, a summary of vegetable seed treatments, a reference list of the original series, and a tabulation of the fungicides discussed, including the trade name, composition, and source of each.

Studies upon the copper fungicides.—V, A critical examination of the fungicidal value of copper compounds, H. Martin, R. L. Wain, and E. H. Wilkinson (*Ann. Appl. Biol., 29 (1942), No. 4, pp. 412–438, illus. 2*).—The germination of fungus spores (largely *Macrosporium sarcinaeforme*) exposed to known concentrations of different Cu compounds was examined with the minimum interference of impurities. Under the test conditions linear relationships were obtained between the logarithm of the Cu concentration and probit germination, results falling in most trials on a single line enabling a characterization of fungicidal value by two statistics, one defining the slope of the line (regression coefficient) and another the position of the line (median lethal dose). The regression coefficient affords a measure of the inherent toxicity of the fungicide and is to a large degree independent of the particle size of the material examined. The median lethal dose affords a measure of the availability of the compound insofar as this property is determined by physical factors such as particle size. Under certain conditions the probit-germination points fall on lines of different slope, of which three cases are distinguished and discussed. A wide group of Cu compounds exhibit a common regression coefficient which can be attributed to the cupric ion. Basic derivatives yield regression coefficients smaller than that of the cupric ion. Derivatives in which coordination with the formation of complex ions can occur may exhibit more than one regression coefficient, a tendency that can be correlated with the stability of the complex ion. Detailed discussion is given of the various Cu salts studied.

The simplest hypothesis concerning the mode of toxic action accounting for the results obtained, (1) with bordeaux and burgundy mixtures and most relatively insoluble derivatives yielding the cupric ion regression coefficient, is solution by spore exudate by complex ion formation yielding cupric and complex ions of which the cuprimalate is that of most direct toxicity; (2) with soluble derivatives readily yielding cupric ions, is interaction with spore exudate, fungicidal acton preceding as in (1); (3) with yellow cuprous oxide, is a decomposition by which half the Cu reaches the spore by the cupric ion route; (4) with red cuprous oxide, cupric oxide, basic Cu compounds, and the complex amino-acid derivatives, is that fungicidal action follows a more complicated series of reactions the nature of which cannot be deduced from the results obtained; and (5) with the sebacate and phthalate, is that the undissociated molecule may be directly fungicidal, an action independent of cupric ion formation.

Standard laboratory bordeaux mixture (*Phytopathology, 33 (1943), No. 7, pp. 633–634*).—In the laboratory assay of fungicides it is necessary to employ a standard fungicide as a check on reproducibility, as a basis for comparison, and, under specified conditions, as a means of adjusting day-to-day variations due to changes in the resistance level of spores. The preparation and use of standard bordeaux is presented, and the technic of determining the bordeaux coefficient is described. This is a report by the Committee on Standardization of Fungicidal Tests.

Studies on the mechanism of fungicidal action.—IV, Mercury, A. F. Parker-Rhodes (*Ann. Appl. Biol., 29 (1942), No. 4, pp. 404–411*).—In continuation (E. S. R., 88, p. 205), figures are tabulated which indicate the effect of a range of compounds of Hg on *Bacillus agri* and on conidia of *Macrosporium sarcinaeforme* and *Botrytis allii*. A technic is described for testing the action of toxins on bacteria in a form capable of analysis by methods of the theory of variability. The following inferences are drawn from estimates of the variability of the spores and cells to the poisons used: *M. sarcinaeforme* absorbed all the Hg compounds tested, but required the molecule of HgCl to be dissociated to Hg and $HgCl_2$ before it could be absorbed; *B. allii* differed in being unable to absorb the methylmercuric ion in its native state; and *Bacillus agri* was unable to absorb Hg except in the form of its chloride and possibly other combined forms produced under the influence of the diffusate from the cells. The significance of the term "absorption" in connection with the fungicidal action of Hg is discussed. Evidence is presented from this study that the toxic effects against bacteria were bactericidal rather than bacteriostatic. The superior toxicity of methylmercuric nitrate over the other compounds tested is commented upon.

A practical method for sterilization and subirrigation of soil in flats, L. H. Jones and W. L. Doran. (Mass. Expt. Sta.). (*Florists Exch. and Hort. Trade World, 100 (1943), No. 22, pp. 9, 11, illus. 1*).—Use of a water-holding tray in which 1 in. of coarse, inert material is placed for drainage is suggested for carrying out the method of Doran et al. previously noted (E. S. R., 88, p. 65) for treating soil with formaldehyde by subirrigation water. On this layer is placed upright a 2.5-in. flower pot into which the irrigation water is poured. The soil (equal parts of loam and sand recommended) added above this layer is firmed around the pot and edges of the flat and the whole gently firmed with a block of wood. A fresh solution of formaldehyde (1 teaspoonful to 1 gal. water) is applied through the pot after seeding until the moisture rises to the soil surface evenly, and the flat is then left uncovered to prevent retention of the gas long enough to injure the seed. The flats are watered as needed through the flower pot.

Virus—a trouble of increasing importance (*Maryland Sta. Rpt. 1941, pp. 35–36*).—Based on work with plant viruses, it is claimed that for the first time with any virus it has been possible to inhibit multiplication of the pathogenic protein in the living cell, this being accomplished by use of cyanides.

Accuracy of the local-lesion method for measuring virus activity, I, II (*Amer. Jour. Bot., 30 (1943), Nos. 4, pp. 280–290; 5, pp. 340–346*).

I. *Tobacco mosaic virus*, E. L. Spencer and W. C. Price.—An experimental procedure is outlined for estimating the activity of this virus by the local-lesion method, involving comparison of an equal number of dilutions of a standard and an unknown. Since the slope of the dilution curve is considered, the method proved superior to one involving only one dilution each of the standard and the unknown. Early Golden Cluster beans were used as test plants and clarified juice of infected Turkish tobacco as the virus solution. By this method the error of estimation increased as the difference between the standard and the unknown widened. By determining the approximate activity of an unknown in a preliminary test and adjusting the standard accordingly for a final test, it became possible to determine the activity of the unknown with an error not exceeding 10 percent. The most efficient test proved to be that in which two dilutions of a standard virus preparation and two of an unknown were paired on opposite half-leaves of bean, a factor for difference and one for slope being obtained from comparisons on paired leaves of the same plants. With three dilutions of each preparation, a log-interval of 1.0 gave more accurate results than one of 0.5. In a limited series of tests, five dilutions were no more accurate than three covering the same total dilution range. In general, best results were obtained when the most concentrated samples produced 15–35 lesions per half-leaf.

II. *Tobacco-necrosis, alfalfa-mosaic, and tobacco-ringspot viruses*, W. C. Price and E. L. Spencer.—The procedure outlined above for estimating tobacco-mosaic virus activity was applied in studying the accuracy of measurement of three other viruses. This method, which takes into account the dilution-curve slope, averaged greater accuracy with all three viruses than the method of taking the direct ratio of total numbers of lesions as an estimate of relative activity. The method described gave an average inaccuracy of measurement of the order of 11 percent for tobacco-necrosis virus, 18 percent for that of alfalfa mosaic, and 14 percent for tobacco ring-spot virus when the unknown was 25–100 percent of the standard. At these concentration levels, the greatest inaccuracies observed were 32, 40, and 36 percent, respectively, for these three viruses.

Warigo—a disease-resistant wheat, I. F. Phipps, S. R. Hockley and A. T. Pugsley (*Jour. Austral. Inst. Agr. Sci., 9 (1943), No. 1, pp. 17–20, illus. 3*).—This wheat variety, resulting from a Nabawa × Hope cross, is reported to be highly resistant to *Urocystis tritici* and *Erysiphe graminis tritici* and to *Puccinia graminis tritici* in the mature plant state, partially resistant to *Tilletia tritici* and *T. levis,* and highly susceptible to the single collection of *Ustilago tritici* tested It is described as "a strong flour wheat with exceptional dough stability."

Comparison of certain mercury and non-metallic dusts for corn seed treatment, P. E. Hoppe. (U. S. D. A. and Wis. Expt. Sta.). (*Phytopathology, 33 (1943), No. 7, pp. 602–606, illus. 2*).—Though the field and laboratory tests reported were limited in scope, the results obtained indicate promise for non-metallic dusts as possible substitutes for the Hg compounds. Those with Spergon showed limitations in its usefulness for control of seed-borne infection, but it may have value as a protectant dust for sound seed planted under unfavorable conditions. Thiosan was far superior to Spergon and about equal to the Hg dusts against *Diplodia zeae* (the test organism used in this study) in the laboratory tests, but unfortunately it was not tried out in the field tests.

Cotton seedling diseases and boll rots, distribution and dissemination (*U. S. Dept. Agr., Bur. Plant Indus., Soils, and Agr. Engin., Plant Disease Rptr., 1943, Sup. 141, pp. 53–78, illus. 2*).—The following reports summarize the results of 4 yr. of surveys for cotton diseases and of special studies on distribution and dissemination suggested by observations made during the surveys: Occurrence of the Anthracnose Fungus, *Glomerella gossypii,* on Cotton Plants Grown From Infested Seed at Four Locations in 1941, by R. Weindling (pp. 59–65); Relation of Ginning to Contamination of Cotton Seed by the Anthracnose Fungus, by R. Weindling and P. R. Miller (pp. 65–72); and A Summary of Four Years of Cotton Seedling and Boll Rot Disease Surveys (pp. 54–58), The Dissemination of Fungus Spores From Contaminated Seed Cotton During Ginning in Relation to the Germination of the Seed and the Diseases of the Seedlings (pp. 72–75), and The Probable Effect of Humidity on the Survival and Sporulation of the Anthracnose Fungus on Cotton (pp. 76–78), all by P. R. Miller.

Pythium ultimum and the damping-off of cotton seedlings, C. H. Arndt. (S. C. Expt. Sta.). (*Phytopathology, 33 (1943), No. 7, pp. 607–611*).—This fungus was found to be a frequent cause of damping-off in cotton seedlings in a South Carolina field when planting was followed by cool rainy weather. When the seedlings were grown at soil temperatures of 18°, 21°, 24°, 27°, and 30° C. and a soil moisture content of 60 percent, the pathogen caused little damping-off at 30° but severe damping-off at the lower temperatures, all seedlings being killed at 21° and 18°. Results with seedlings grown for 6 days and 12 days at 30° in inoculated soil and then transferred to 22° indicated that the fungus will cause severe losses from damping-off only if soil conditions are favorable to infection before the seedlings have reached a developmental stage comparable to that reached in a growth period of 6 days at 30°.

Reginning and dusting cotton seed help win the war, S. G. Lehman (*Res. and Farming* [*North Carolina Sta.*], *1 (1943), Prog. Rpt. 2, pp. 5, 6*).—Reginning to remove the linters has been found to carry off much of the load of fungus spores and bacteria adhering thereto, and subsequent treating of the seed with a disinfectant saves many seedlings that would otherwise die of disease and makes possible a lower seeding rate. Supporting data are presented.

Influence of certain diseases and threshing injury on flax stands in Washington, M. L. Schuster, D. D. Forsyth, and J. G. Harrar (*Washington Sta. V Cir. 8 (1943), pp. 4, illus. 3*).—These studies indicate that it is important to plant undamaged seed or, if it is injured, to treat it with one of the prescribed fungicides. Some of these may become difficult to obtain because they contain Hg. With certain seed lots Spergon was not as consistently effective as New Improved Ceresan in the field, though it was equally effective in greenhouse tests.

Seed-treatment of flax, H. H. Flor. (Coop. U. S. D. A.). (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 5, pp. 23–26*).—Treatment with New Improved Ceresan (0.5 oz. per bushel) proved beneficial to yellow-seeded flax. This preparation also increased the stand of high-quality brown-seeded flax containing broken and cracked seed. Most lots of brown-seeded flax with 80–89 percent germination were benefited, as also were some lots with appreciable quantities of weathered or discolored but not sprouted seed. Such treatment was not beneficial to seed lots of high quality and little mechanical injury, to sprouted seeds, or to those of low germinability.

Transmission of spotted wilt through potato tubers, D. Norris and J. G. Bald (*Jour. Austral. Inst. Agr. Sci., 9 (1943), No. 1, pp. 34–35*).—The experiment described indicated that tuber transmission of this virus disease may occur in both greenhouse and field.

Spraying and dusting potatoes.—II, To control potato diseases, W. E. Brentzel (*North Dakota Sta. Bul. 319 (1943), pp. 14–19 illus. 2*).—This is a progress report on potato disease control work, involving copper-containing sprays and dusts in particular. Late and early blights, bacterial ring rot, and virus diseases are considered, and a spraying and dusting schedule is presented. Attention is called to the direct beneficial effects of copper fungicides on yields.

Late blight of potatoes in North Dakota, W. E. Brentzel (*North Dakota Sta. Cir. 67 (1943), pp. 7, illus. 3*).—The year 1942 is reported to have been the first in which *Phytophthora infestans* infection became an economic problem in the Red River Valley of the North. An abundance of infected seed held for planting presents a current problem. This circular gives timely information on the symptoms and control of late blight.

Development of blight-immune varieties, D. Reddick. (Cornell Univ.). (*Amer. Potato Jour., 20 (1943), No. 5, pp. 118–126*).—This paper "is essentially an orientation of published facts presented in a fashion designed to give an overall picture of the blight-immunity situation as it exists at the present time. Those places where speculation or indications are introduced are the places where more intensive work is called for. It is to be hoped that more persons will become interested in the general problem of overcoming permanently this century-old menace to potato production, and that this statement will be of help to them in overcoming or avoiding some of the difficulties involved."

Late blight of potatoes and its control under southern conditions, A. H. Eddins and C. N. Clayton. (Fla. and S. C. Expt. Stas.). (*Amer. Potato Jour., 20 (1943), No. 5, pp. 107–112*).—Late blight (*Phytophthora infestans*) attacks potatoes grown in the southern United States, especially in seasons when the weather favors its development, and causes serious losses nearly every year in some localities, but more particularly in Florida. The authors are indebted to plant pathologists in nine Southern States for supplying the information on the disease and its control here summarized. It is concluded that late blight can be controlled fairly well in most seasons, even when infection is severe, if the plants are sprayed or dusted regularly with copper sprays or dusts. Poor control can usually be traced to use of infected "seed," ideal conditions for disease development in some seasons, failure to apply adequate fungicidal control measures (including proper coverage), and prolonged rainy periods ideal for fungus dissemination but inimical to fungicidal application.

Southern blight, Corticium rolfsii, of potato tubers, G. F. Weber. (*Fla.* Expt. Sta.). (*Phytopathology, 33 (1943), No. 7, pp. 615–617, illus. 1*).—The symptoms are described in detail. During humid rainy weather the fungus attacks plants at the soil surface, producing stem girdling and infection on aerial parts in contact with the soil. As the soil surface dries the pathogen appears to cause infection at successively lower levels, and when roots in the vicinity of the tubers are infected the tubers themselves may be attacked, as in the dry season here reported upon.

The effect of zinc oxide on the cut surfaces of potato tubers, J. G. Bald (*Jour. Austral. Inst. Agr. Sci., 9 (1943), No. 1, p. 35*).—Preliminary experiments showed that this disinfectant does not inhibit suberization to any noticeable degree.

Chlorosis in Sudan grass, F. L. Wynd. (Univ. Ill.). (*Plant Physiol., 18 (1943), No. 2, pp. 303–305*).—Although Sudan grass grows luxuriantly in southern Texas, successive cuttings become progressively chlorotic, the plants finally becoming so devoid of chlorophyll as to stop further growth. From the evidence presented, it is believed that the condition is not due to pH values of the soil, to the availability of trace elements, to calcareous layers in the soil, or to any intrinsic inability of the roots to support continued vegetative growth. Climatic factors may prevent the appearance of chlorosis, although it is deemed probable that such effects are secondary to some unknown nutritional property of the soil profile.

Seed rot and seedling blight of sorghum, R. W. Leukel and J. H. Martin (*U. S. Dept. Agr., Tech. Bul. 839 (1943), pp. 26+*).—Laboratory, greenhouse, and field studies indicated that poor sorghum stands are not due solely to a cold, wet seedbed and the washing of soil into the furrows by rain, but that seed-borne and soil-inhabiting fungi are also important contributors. Species of *Alternaria, Fusarium, Penicillium, Aspergillus,* and *Rhizopus* were found on the seed in great abundance, and other fungi less frequently. Especially virulent strains of *F. moniliforme* and *P. oxalicum* were seed-borne and capable of reducing emergence and causing severe seedling blight, especially at 15° and 20° C. *Rhizopus* and *Aspergillus* species, though causing some reduction in emergencies, were less harmful. On the whole, *Alternaria* spp. gave little evidence of pathogenicity. Soil-inhabiting fungi were usually more instrumental in inhibiting emergence than were the ordinary seed-borne fungi and were also less easily combated by seed disinfectants, especially at low temperatures.

Isolates from seeds failing to germinate in cold unsterilized soil, from aborted sprouts, and from roots and crowns of diseased seedlings most frequently yielded Pythiums, and Fusariums were next in the order of frequency. When used as inoculum, most *Pythium* isolates proved extremely virulent in inhibiting emergence and in blighting seedlings, as also did cultures of eight species from other sources. Pythiums frequently inhibited emergence by invading the young plumule or by destroying the mesocotyl, seminal root, or subcrown rootlets before the crown roots had developed. As a rule, soil-inhabiting Fusariums were less virulent and responded more readily to seed treatment than the Pythiums.

Very poor emergence was obtained from surface-sterilized seed that had been slightly nicked and planted in sterilized inoculated soil. Such injuries, common on machine-threshed sorghum, expose the endosperm to invasion by fungi, which deplete the food supply and produce toxins inimical to primary root development.

Sorghum seedlings failed to develop roots normally when grown on nutrient agar sterilized after having produced cultures of *Rhizopus*, *Penicillium*, or *Aspergillus*.

Soybean diseases and their control, H. W. Johnson and B. Koehler (Coop. Ill. Expt. Sta.). (*U. S. Dept. Agr., Farmers' Bul. 1937* (*1943*), *pp. 24+, illus. 16*).—The three sections of this manual deal, respectively, with leaf, stem, pod, and seed diseases; root and crown diseases; and control measures, involving resistant varieties, crop rotation, disease-free seed, seed treatment, and disease exclusion.

Soft rot of sweet potatoes and its control, R. H. Daines (*New Jersey Stas. Bul. 698* (*1942*), *pp. 14, illus. 2*).—Soft rot due to at least nine species of *Rhizopus* but with *R. nigricans* most commonly involved is said to be the most destructive postharvest disease of sweetpotatoes in New Jersey. It may develop at 38°–107.6° F. The optimum for *R. nigricans* was found to be 65°–73.4° and the optimum humidity at the higher temperature 75–84 percent. Prevention during storage involves cleanliness in the storage house and hampers, exclusion of rodents, avoidance of frost injury and sunscalding, care in handling from harvest to storage, and maintenance of the proper temperatures and humidities. For the curing period of 10–14 days, 80°–85° and a relative humidity of about 90 percent are recommended, following which the roots should be stored at 55° and a relative humidity of 85–90 percent. The greater the bruising or scratching between storage and marketing the greater the risks from soft rot during this period. Dipping the roots in borax solutions following storage was found to reduce significantly the loss from soft rot during marketing, but the procedure is not at present recommended because of the lack of definite knowledge as to the effects of boron compounds on human health. A sodium hydrogen carbonate dip improved the appearance of the light-colored varieties.

Tobacco diseases in 1942, P. J. Anderson (*Connecticut* [*New Haven*] *Sta. Bul. 469* (*1943*), *pp. 106–128, illus. 9*).—This is a detailed progress report on studies of downy mildew and *Sclerotinia-Botrytis* disease. With regard to the former, the 1942 results give hope that Fermate may prove an effective spray, though tests over a period of several years must be carried out before final conclusions can be drawn. Better methods of using paradichlorobenzene were developed, involving its distribution on cheesecloth supported under the glass sash above the plants. This technic proved highly successful, even at low temperatures. As to the second disease, the past season's work has crystallized previous observations and given proof of the importance, not previously recognized, of *Botrytis* and of *S. sclerotiorum* to tobacco pathology. Descriptions of the varied manifestations of the disease due to these two fungi and of their relationships and developmental courses throughout the season are presented. From the standpoint of symptoms, they manifest themselves as a leaf spot and rot in the field, stalk canker in the field, stalk rot and pole rot in the shed, and bed rot or damping-off. Remedial measures for the various phases of this disease complex are suggested. Practices tending to better ventilation and reduction of moisture, and spraying with bordeaux, have proved effective in the plant beds; pole rot can be controlled by properly "firing" and ventilating the sheds; for leaf rot and stalk canker, no practical remedy has yet been found.

Severity of curly top in tobacco affected by site of inoculation, W. C. Price (*Phytopathology, 33* (*1943*), *No. 7, pp. 586–601, illus. 1*).—Grafting normal Turkish tobacco with scions from tobacco plants recently infected with sugar beet curly top virus sometimes resulted in severe symptoms, at other times in mild, and at still other times in intermediate symptoms. Similar results followed when tobacco plants were grafted with scions from tobacco that had recovered from infection. On the average, scions from recently diseased plants caused somewhat more severe symptoms than those from recovered plants, though the difference was inconsistent. Grafting healthy tomato plants with scions from recovered tobacco plants resulted in severe symptoms—usually ending in death—or in absence of symptoms, the virus either failing to pass the graft union or to reach the growing point of the grafted plant. The symptom variation in tobacco grafted with scions from recovered plants could not be accounted for by variation in plants or plant position from which the scions had been taken, by interaction of virus strains, by age of test plants at time of infection, or by growth rate of inoculated plants. There was also but little correlation between severity and time after grafting when the symptoms first appeared. The severity of symptoms in Turkish tobacco after infection via the vector depended in part on the portion of the plant on which the insect fed, severe symptoms invariably following when the vector fed near the growing point but frequently only mild or moderate symptoms when the vector fed on single leaves or stem portions well below the growing point. Thus transmission to old tissues by the vector was comparable to that by grafting with scions from recently diseased or recovered plants. These results are believed to lend doubt that any protective substances are transmitted through the graft union.

Reaction of resistant tobaccos to certain strains of Nicotiana virus 1 and other viruses, H. H. McKinney. (U. S. D. A.). (*Phytopathology, 33 (1943), No. 7, pp. 551–568, illus. 6*).—This work deals largely with the tobacco collection T. I. 448A, which is highly resistant to common tobacco mosaic virus (*Nicotiana* virus 1). Young plants of this tobacco proved exceedingly resistant to three collected and seven isolated strains of this virus. The severe-yellowing strains induced primary and secondary yellow spots on a few leaves, but virus syntheses were at a very low level and the virus failed to reach the upper portion of mature infected plants. Spotting tended to progress down the leaf as it grew. The spread of chlorosis from the initial spots tended to be greatest in the leaf margins and tip. Thus it appears that this spread is not correlated with the rate of cell division, which is less rapid toward the tip than in the lower margins. The available evidence shows rather conclusively that the secondary chlorotic spots in T. I. 448A and Ambalema tobacco result from destruction of chlorophyll rather than from prevention of its synthesis. From observations on Wisconsin-Havana Seed (very susceptible) and T. I. 448A tobaccos, it appears likely that the initial quantity of virus entering the youngest leaves in a highly susceptible tobacco may be too small to insure all parenchyma cells receiving their quota of virus before the chlorophyll is synthesized, and that those cells receiving virus after the appearance of chlorophyll do not become chlorotic for a time at least, depending on the virus used. This results in the classical mosaic pattern. The evidence further suggests that relatively few virus particles move long distances in the plant. It is of special interest that none of the mutants from the common-mosaic virus seemed to possess greater invasive powers than the parent virus, and some of them seemed less invasive. Results of inoculations in *N. glauca* are believed to indicate that a single strain of virus cannot be used to show the precise mosaic-resistance-gene make-up in mosaic-resistant plants.

In breeding work, the gene complexes of the genus *Nicotiana* seem to combine in so many different ways as to make it highly probable that all the strains of the common-mosaic virus would have to be used as testers to detect all of the gene complexes controlling the various types and degrees of disease expression in the genus. However, since all the evidence available indicates that *Nicotiana* virus 1 interferes with the unlimited increase and spread of its mutants, it seems highly probable that the resistant tobaccos Ambalema and T. I. 448A may be regarded as very poor natural reservoirs for mutant viruses arising from

Nicotiana virus 1. Tobacco T. I. 448A appears to be one of the best (if not the best) genotypes now available in breeding work for resistance to common mosaic virus and its mutants.

Asparagus rust and measures for its control, J. D. MENZIES (*Washington Sta. V Cir. 2* (*1942*), *pp. 3*).—Eradication of wild or uncut plants, spray for the overwintering stage, spray or dust for the summer stage, and use of resistant varieties are recommended measures.

The mummy disease of the cultivated mushroom, C. M. TUCKER and J. B. ROUTIEN (*Missouri Sta. Res. Bul. 358* (*1942*), *pp. 27, illus. 8*).—This malady has caused serious losses in Missouri since 1935, when it was recognized as an undescribed disease. It occurs in caves and houses, developing under fairly wide ranges of temperature and humidity. Infection causes the development of abnormal sporophores, with elongated slender stipes and small tilted pilei. In more advanced stages most of the sporophores are arrested at the button stage, becoming gray or brown, dry, spongy, and mummified. The disease spreads through beds at the rate of about 1 ft. per day, and affected beds are permanently out of production. Transmission has been secured only by transferring casing soil or compost from affected to normal beds. Cultures of several species of fungi and bacteria secured from diseased sporophores failed to initiate infection. The disease does not spread readily from bed to bed, even in the same tier, but the causal agent is present in the casing soil and compost to a distance of 4–6 ft. in advance of the youngest visibly diseased sporophores. The usual incubation period is about 3 weeks. There is no evidence of insect transmission. The infectivity of soil and compost from affected beds is destroyed quickly by drying, by heating to moderate temperatures, and by chemical treatment. Anything that kills the *Agaricus* mycelium probably renders the soil or compost noninfectious. The rate of spread and difficulty of transmission suggest the possibility that the disease may be caused by a virus transferred only by anastomoses between infected and normal hyphae. Attempts to reclaim affected beds by recasing and by treatment of the casing soil with chemicals were unsuccessful. The progress of the disease through the beds was stopped by $HgCl_2$ barriers and, more effectively, by narrow trenches across the beds 6–8 ft. in advance of visibly affected sporophores. Division of beds into short sections by double cross boards with a narrow air space between them has reduced losses to unimportant proportions in commercial houses.

"Red ring" of tomato stems caused by an insect, Cyrtopeltis varians (Dist.), at Charleston, S. C., G. B. REYNARD. (U. S. D. A.). (*Phytopathology, 33* (*1943*), *No. 7, pp. 613–615, illus. 1*).—Reddish brown marks encircling the stems and petioles were found due to this mirid bug. Similar injury has been reported from California, where the damage was greater.

Bitter rot of apples and its control in Delaware, S. L. HOPPERSTEAD, M. W. GOODWIN, and K. J. KADOW (*Delaware Sta. Bul. 241* (*1943*), *pp. 24, illus. 3*).—Though usually a minor disease in Delaware, bitter rot is serious on some varieties. Following a general account of the symptoms and life history of the fungus (*Glomerella cingulata*), the results of the present study (1938–40) are presented. Removal of diseased fruits and mummies proved unimportant for control, bordeaux (4–4–100) being needed on susceptible varieties. Spraying must be started by the fourth or fifth cover and repeated at least every 2 weeks; the first two applications may be strong bordeaux, followed by weaker concentrations in later sprays. The seasonal Cu load for adequate protection was found to be about 200 μg per square inch of leaf surface. The insoluble Cu materials failed to give satisfactory control, poor adherence usually being the cause here as well as for bordeaux sprays. As a group, the former did not correct arsenical injury as well as bordeaux. Control was not aided by any of the various spreader-stickers used, though the fungicidal deposits were in some cases increased.

Particle size of sulphur and copper fungicides in relation to apple scab and cedar-apple rust control, J. M. Hamilton, D. H. Palmiter, and G. L. Mack. (N. Y. State Expt. Sta.). (*Phytopathology, 33 (1943), No. 7, pp. 533–550, illus. 4*).—The fungicidal effectiveness of ground wettable S and an insoluble Cu fungicide proved inversely proportional to particle size, as established by field, greenhouse, and laboratory tests. Ground to 3 degrees of fineness to include the range in most commercial materials, they were tested against *Venturia inaequalis*, *Gymnosporangium juniperi-virginianae*, and *Sclerotinia fructicola*. Similar tests were conducted with commercial wettable sulfurs whose fungicidal capacities were affected not only by particle size but also by the presence of various adjuvants and by manufacturing methods. When S materials were prepared by the Grinrod and flotation processes they were relatively less adhesive than ground S of equal particle size, provided no material was added to aid retention. Particle-size measurements were checked by four methods, with fair agreement. The Andreasen sedimentation and air-permeation methods were deemed the most reliable procedures. Photomicrographs further confirm the results of the above determinations and emphasize the fact that for a given weight of material there are many more particles per unit area for a fine than for a coarse powder.

Laboratory tests of bactericides on the plum and cherry bacterial canker organism (Pseudomonas mors-prunorum Wormald).—I, The toxicity of some inorganic materials, especially copper compounds, and the effect of hydrogen ion concentration on the organism, H. B. S. Montgomery and H. Shaw (*Ann. Appl. Biol., 29 (1942), No. 4, pp. 399–403*).—In laboratory tests of 29 metals as soluble salts (mostly nitrates), the most toxic to this organism were Hg, Ag, Au, U, and Cu, in descending order. Differences in toxicity among the Cu compounds and preparations could not be explained by variations in the pH of the medium, but the outstanding activity of bordeaux among the relatively insoluble forms of Cu was accountable in terms of alkalinity from the lime component. The range of tolerance of the bacteria to pH was about 3.2–10.4.

Rasp leaf of cherry, E. C. Blodgett. (Idaho Expt. Sta.). (*Phytopathology, 33 (1943), No. 7, pp. 620–622, illus. 1*).—The symptoms and distribution of this disease shown to be due to a virus, are given. It was readily transmitted by bud inoculation, with an incubation period of about 9 mo.

Wilt of cacao fruits (Theobroma cacao), I, II, E. C. Humphries (*Ann. Bot. [London], n. ser., 7 (1943), No. 25, pp. 31–44, illus. 5; pp. 45–61, illus. 5*).

I. *An investigation into the causes.*—From a 3-yr. study of mature budded and grafted trees, ordinary estate trees, and selected young clones the following evidence is adduced in support of the theory that cacao wilt is due primarily to nutrient and water deficiency. Early set fruits matured or became diseased at a relatively late stage, whereas fruits set later usually wilted. When the crop began to ripen, many of the fruits then setting did not wilt and eventually ripened. As the season progressed, the size at which fruit wilted became progressively smaller until the crop matured, after which the size at wilting became larger again. Fruits on the thinner branches (farther from the ground) were more susceptible than those on the thicker branches. Most of the fruits tended to wilt during the maximum demand of the trees for mineral nutrients. Young trees were particularly affected by a heavy flush of new leaves causing the fruits to wilt. Moisture relations of the soil and air appeared important in determining the position of fruits on the tree. During and following periods of high soil moisture the variance of distances from the ground of setting fruits was high, i. e., fruits were more scattered over the tree. No evidence was found that weather had any direct effect on wilt incidence, though any adverse conditions tending to accentuate the competition for nutrients would be expected to result in increasing the wilt, particularly in young cacao trees.

II. *A preliminary survey of the carbohydrate metabolism, with special reference to wilt susceptibility.*—Changes in water content, dry matter, carbohydrate, and glycosidic glucose in the fruit wall and pulp during development were followed from fertilization to maturity, from which it is shown that the growth period may be divided into two phases, viz, (1) a developmental period occupying about 75 days, during which the fruit is susceptible to physiological wilt, and (2) a phase of active metabolism, during which fat, starch, and sucrose accumulate in the seed.

ECONOMIC ZOOLOGY—ENTOMOLOGY

Biology: The science of life, M. S. MacDougall, in collab. with R. Hegner (*New York and London: McGraw-Hill Book Co., 1943, pp. 963+, illus. 555*).—The several parts are as follows:The foundations of biology (pp. 5–93); plant biology (pp. 95–222); animal biology (pp. 223–515); general biology—organs, systems, and their functions—and the biology of man (pp. 517–698); some biological principles and theories (pp. 700–802); applied biology—biology and human welfare and conservation (pp. 803–854); and the history of biology (pp. 855–870).

Wildlife refuges, I. N. Gabrielson (*New York: Macmillan Co., 1943, pp. 257+, illus. 49*).—The history and the accomplishments of the national wildlife refuge system administered by the U. S. Fish and Wildlife Service, including the refuges administered by the U. S. D. A. Forest Service and the National Park Service, are presented in 17 chapters. While the information was largely secured from the files of the wildlife service or from the published material based on them, the work has been prepared from a background of the author's personal observation, in the course of which every major national refuge except one has been visited at least once, and also of most of those in Alaska, the national parks, and some of both the Canadian and Mexican parks. Included is a bibliography of seven pages.

A simplified method for determining the condition of white-tailed deer herds in relation to available forage, B. C. Park and B. B. Day (*U. S. Dept. Agr., Tech. Bul. 840 (1942), pp. 60+, illus. 21*).—The results of a long series of measurements are presented, and description is given of a simple method, the application of which if employed would lead to the saving of an immense amount of effort on the part of management men. During five consecutive hunting seasons, 1935–39, on the Allegheny National Forest in Pennsylvania, 1,787 deer were measured. The measurements taken included dressed weight, length of body, length of tail, length of hind foot, circumferences of main beam, length of antler, spread of antlers, and number of points. Provided the sample is representative, deer weights and measurements data can be a reasonably reliable basis for the determination of annual increase, percentage of mature and immature animals (age classes), sex ratio of mature and immature animals, percentage of adult does producing fawns, distribution of hunters and kill, and percentage of decrease for each sex and age class through hunting effort.

A list of 9 references to the literature cited is followed by a bibliography of 26 titles.

Notes on the pine mouse, R. N. Jefferson. (Va. A. and M. Col.). (*Va. Fruit, 31 (1943), No. 5, pp. 10, 12, 14, illus. 1*).—Observations of the pine mouse (***Pitymys pinetorum pinetorum***), made in Patrick County in the vicinity of

Stuart, Va., which included trapping records, reproduction, and food, are reported.

Orchard mouse control, A. M. Woodside. (Va. Expt. Sta.). (*Va. State Hort. Soc. Rpt., 47 (1942), pp. 111–115*).

Ecology and management of the mourning dove (Zenaidura macroura (Linn)) in Cass County, Iowa, H. E. McClure (*Iowa Sta. Res. Bul. 310 (1943), pp. 353–415*).—Report is made of an investigation conducted during 30 mo. of 1938, 1939, and 1940 of the life history, production, and management of the mourning dove with a view to determining some of the habits of the bird and the number normally produced in the southwestern Iowa area and if advisable to devise management practices to increase production.

"Detailed investigations at Lewis, at 14 farmyards and at 6 other habitat types, brought under observation nearly 4,000 nests. The preferred types of trees were elms and conifers. The average success of nestings was 50 percent, an average of 55 percent of the eggs was hatched, and an average of 82 percent of young left the nests yearly. The peak of nesting activity came during the middle of June, followed by a slump in August and a slight increase in the fall. The robin-dove relationship was greatly of advantage to the dove in nesting. Of seeds in the crops of 157 young that died of falls from nests, hemp seed was most important in weight, followed by wheat, corn, green foxtail, yellow foxtail, hegari, prostrate pigweed, creeping spurge, painted spurge, lesser ragweed, Sudan grass, and wood sorrel, each in quantity more than 1 gm.; 33 other species were present in smaller quantities. Calcium in the diet was furnished in part by small land snails eaten in abundance. Young doves were banded between the ages of 4 and 8 days. Returns from these bands came from Louisiana, Oklahoma, Texas, Mexico, and Central America."

Instructions are given for a fall population estimate by counts of active nests and nesting birds with estimated production in midsummer. Management suggestions for increasing dove production include the planting of elms and evergreens in town and evergreens and fruit trees in the country and English sparrow control, particularly on farms.

The prairie chicken [Tympanuchus cupido americanus] in Illinois, R. E. Yeatter (*Ill. Nat. Hist. Survey Bul., 22 (1943), Art. 4–5, pp. 377–416+, illus. 19*).

Germinated seed versus ungerminated seed in the diet of adult bobwhite quail, R. B. Nestler (*Poultry Sci., 22 (1943), No. 3, pp. 227–229*).—Report is made of two tests that were conducted to determine whether adult captivity-reared bobwhite quail prefer germinated seed to ungerminated seed. In the first test acorns (*Quercus nigra*), wild beans (*Strophostyles helvola*), yellow corn (*Zea mays*), and black locust seeds (*Robinia pseudoacacia*) were studied in the fresh stage, whereas in the second test bush clover seed (*Lespedeza stipulacea*) was studied after the germinated seed had been dried at 100° F. There was a tendency, especially in the case of the dried lespedeza, for the ungerminated seed to be preferred, except in the case of wild beans, where a decided preference was shown for the germinated seed. Over a period of 6 weeks, during winter outdoors in holding pens, adult quail maintained their weight as satisfactorily on a diet containing 50 percent ungerminated lespedeza as on one containing 50 percent germinated lespedeza.

Preferential rating of duck food plants, F. C. Bellrose, Jr., and H. G. Anderson (*Ill. Nat. Hist. Survey Bul., 22 (1943), Art. 4–5, pp. 417–433+, illus. 17*).

Fish for food from farm ponds, V. E. Davison and J. A. Johnson (*U. S. Dept. Agr., Farmers' Bul. 1938 (1943), pp. 22+, illus. 12*).—A description of ways in which fishponds can be constructed with the equipment and materials ordinarily available on farms and how such ponds can be managed to encourage rapid production of an ample supply of fish for farm use.

The Physalopterinae (Nematoda) of Aves, B. B. Morgan. (Univ. Wis.). (*Amer. Micros. Soc. Trans., 62 (1943), No. 1, pp. 72–80, illus. 14*).—Included in this contribution is a key to the species of *Physaloptera* found in Aves and a parasite host list of the 12 species, together with a list of 49 references to the literature.

The insecticidal principle in the fruit of the Amur corktree, M. S. Schechter and H. L. Haller, (U. S. D. A.). (*Jour. Organic Chem., 8 (1943), No. 2, pp. 194–197*).—An attempt made to isolate the insecticidal principle from the fruit of *Phellodendron amurense*, native to several Asiatic countries and introduced into the United States in 1856, is reported upon. The unsaponifiable portion of the oil was found to be very toxic to houseflies in acetone solution but not in high-boiling kerosene.

Cryolite as a lead arsenate substitute, R. H. Hurt (*Va. State Hort. Soc. Rpt., 47 (1942), pp. 47–50*).

Insects injurious to cotton in Tanganyika Territory, W. V. Harris (*Tanganyika Dept. Agr. Pam. 29 (1942), pp. 11+, illus. 3*).

Spraying and dusting potatoes.—I, To control potato insects, J. A. Munro and H. S. Telford (*North Dakota Sta. Bul. 319 (1943), pp. 3–13, illus. 8*).—A practical account, with special emphasis on control for the potato flea beetle, Colorado potato beetle, potato leafhopper, grasshoppers, blister beetles, plant bugs, aphids, and potato psyllids. Notes are also included on natural control, dusting v. spraying, bordeaux and yields, copper dusting, and cost offset by increased yield.

War-time control of insects attacking the victory garden, C. Lyle (*Miss. Farm Res. [Mississippi Sta.], 6 (1943), No. 4, p. 1*).—A practical account.

[Truck crop pests], L. Haseman (*Missouri Sta. Cirs. 259–260, 262–263 (1943), pp. [2] each*).—Included are the following practical accounts: Nos. 259, Prevent Cabbage Worm Injury; 260, Flea Beetle Damage to Garden Crops; 262, Prevent Potato Beetle Damage; and 263, Controlling Bean Leaf Damage by Beetles.

Strawberry insects and their control in Missouri, W. W. Smith (*Missouri Sta. Bul. 463 (1943), pp. 22, illus. 13*).—A practical account.

Insects destructive to food in the home, L. Haseman (*Missouri Sta. Cir. 265 (1943), pp. 8, illus. 2*).—A practical account.

Annual report of the forest insect survey, 1942, A. W. A. Brown (*Canada Dept. Agr., Forest Insect Survey Ann. Rpt., 1942, pp. 12, illus. 2*).

Forest entomology: Fourth annual report for the year ending March the 31st, 1941, A. R. Gobeil (*Quebec Dept. Lands and Forests, Contrib. 14 (1942), pp. 16, illus. 3*).

Les insectes forestiers du Québec en 1941 [Forest insects of Quebec in 1941], R. Lambert (*Québec Min. Terres et Forêts, Serv. Ent., Contrib. 15 (1942), pp. 46, illus. 11*).

The parasites of man in temperate climates, T. W. M. Cameron (*Toronto, Canada: Univ. Toronto Press, 1942, pp. 182+, illus. 61*).

The number of cercariae of Fasciola hepatica developing in snails infected with a single miracidium, W. H. Krull. (U. S. D. A.). (*Helminthol. Soc. Wash. Proc., 8 (1941), No. 2, pp. 55–58*).

Diapause in eggs of Austroicetes cruciata Sauss. (Acrididae), with particular reference to the influence of temperature on the elimination of diapause, H. G. Andrewartha (*Bul. Ent. Res., 34 (1943), No. 1, p. 1–17*).

A new species of Metaphycus parasitic on psyllids, H. Compere. (Calif. Citrus Expt. Sta.). (*Pan-Pacific Ent., 19 (1943), No. 2, pp. 71–73*).—A new encyrtid parasite parasitizing the nymphs of the tomato psyllid infesting chili pepper plants in Orange County, Calif., is described under the name *M. psyllidis*.

Dusting for potato psyllid control, W. A. Riedl (*Wyoming Sta. Bul. 260 (1943), pp. 20, illus. 6*).—Results of a 4-yr. study (E. S. R., 85, p. 362) demonstrated that the potato psyllid can be effectively and more economically controlled with 325-mesh dusting sulfur than with lime-sulfur or wettable sulfur sprays. This dust has given better control of adults, eggs, and nymphs and a higher total yield and a higher yield of U. S. No. 1 potatoes than lime-sulfur or wettable sulfur sprays, but yields were not statistically significant in most instances. Microfine dusting sulfur was effective, but because of the higher cost this material should be tested further to determine if lower rates of application will give satisfactory control. Sulfur-copper dust mixtures gave higher yields than sulfur dust alone, even though no blight was present. Sulfur-calcium arsenate and sulfur-cryolite dust mixtures controlled psyllids, but these should be tested further to determine their effectiveness in the control of flea beetles and leaf-chewing insects. Sulfur dust at 30 lb. per acre gave slightly higher yields than the 20-lb. per acre rate. Dusting for potato psyllid control is cheaper, faster, and easier than spraying, and more timely applications can be made, with less damage to the vines and fields.

The psyllid situation in 1940, R. L. Wallis. (U. S. D. A.). (*Nebr. Potato Impr. Assoc. Ann. Rpt., 22 (1941), pp. 10–13, illus. 2*).

Observations on the sand dune chinch bug Blissus mixtus Barber (Lygaeidae: Hemiptera), B. Prendergast (*Pan-Pacific Ent., 19 (1943), No. 2, pp. 59–60*).

The ecology of the principal summer weed hosts of the beet leafhopper in the San Joaquin Valley, California, F. R. Lawson and R. L. Piemeisel (*U. S. Dept. Agr., Tech. Bul. 848 (1943), pp. 38, illus. 11*).—The three principal summer hosts of the beet leafhopper in the San Joaquin Valley are Russian-thistle, bract scale, and fogweed, and of these Russian-thistle is the most important. Distribution and approximate acreages of the three hosts were determined by detailed and transect surveys. All three hosts were abundant on intermittently farmed or recently abandoned lands. On such areas, stands of the hosts did not reappear year after year on the same tracts, but either such tracts were again cultivated or stands of winter annuals replaced those of the summer hosts. On lands abandoned and used for grazing and on unplowed range lands only Russian-thistle formed large acreages under certain conditions, fogweed to a much less extent, and bract scale not at all. Summer annuals do not mature and produce seed in a reasonably good cover of winter annuals. In a series of dry years with undue pressure on the range, the excessive destruction of the vegetation of winter annuals resulting in sparse stands makes favorable conditions for Russian-thistle to grow to maturity and provide a seed supply, particularly so where there are local late spring rains. The large acreages of the summer hosts are due in some localities to intermittent farming and in others to excessive destruction of the vegetation of winter annuals whether by overgrazing or any other cause whatsoever.

Three new western aphids, G. F. Knowlton. (Utah Expt. Sta.). (*Ent. News, 54 (1943), No. 5, pp. 122–124*).—*Kakimia utahensis*, collected from columbine in Utah, and *Myzus harmstoni*, from snowberry, and *Macrosiphum puyallupsi*, from bush lupine, both in Washington, are described as new to science.

The azalea white fly in Australia, R. T. M. Pescott (*Jour. Austral. Inst. Agr. Sci., 9 (1943), No. 1, pp. 29–30, illus. 1*).—The appearance of *Aleurodes azaleae* B. and M. in Victoria is reported.

Effectiveness against the California red scale of cube resins in light-medium and heavy spray oils, A. W. Cressman. (U. S. D. A.). (*Jour. Agr. Res.* [*U. S.*], *66* (*1943*), *No. 11*, *pp. 413–419*, *illus. 1*).—Cube resins were dissolved in an intermediary solvent consisting of 1 volume of trichloroethylene and 2 volumes of dibutyl phthalate, and insecticidal efficiency was determined on the basis of the mortality of females in the gray adult and older stages on fruit and wood in the field and fruit in the laboratory. All sprays used in the field contained 1.5 percent of oil. A gram of cube resins containing 22.3 percent of rotenone was used in 4 l. of diluted spray. Heavy oil without cube was more effective than a light-medium oil, but the two were of equal effectiveness when used with cube. Under laboratory conditions spray containing 1.5 percent of oil and cube resins, with a rotenone content of 27.4 percent, at the rate of 1 gm. to 5 l. was used. A 55.4- and 76.3-percent mortality from a light-medium and heavy oil was increased to 99.2 and 98.6 by the addition of cube. On other sprays containing 1.0 percent of oil and 1 gm. of cube resins to 6 l. of spray, mortality differences between light-medium and heavy oils without toxicants were less, but light-medium oil plus cube was about 4.6 percent more effective than heavy oil plus cube.

Scale insects harm peach trees in North Carolina, C. F. Smith (*Res. and Farming* [*North Carolina Sta.*], *1* (*1943*), *Prog. Rpt. 2*, *p. 12*, *illus. 1*).—A practical account.

The toxicity of some common fumigants to body lice, J. R. Busvine (*Bul. Ent. Res.*, *34* (*1943*), *No. 1*, *pp. 19–26*, *illus. 1*).

American butterflies and moths, C. H. Matschat (*New York: Random House*, [*1942*], *pp. 68+*, *illus. 115*).—The illustrations, many of which are in color, are by R. Freund.

Leaf worm and cotton production, L. Haseman (*Missouri Sta. Cir. 268* (*1943*), *pp.* [*2*], *illus. 1*).—A practical account.

The pistol casebearer in Maryland, H. S. McConnell (*Maryland Sta. Bul. A7* (*1942*), *pp. 173–187+*, *illus. 8*).—Pistol casebearers detach themselves from the twigs and begin feeding when the leaf and fruit buds unfold and often cause serious injury during the preblossom period. They continue feeding on foliage and on fruit to some extent until early June, and then attach themselves to the twigs again to pupate during June. Pupae are first light yellow in color but gradually become dark brown to almost black. The peak of egg deposition may usually be expected early in July. Young larvae that hatch from the eggs feed on the under surface of the leaves, principally in the upper third of the tree. They produce a characteristic shot hole appearance on the leaves and feed throughout late summer and early fall, then attach their cases to the twigs, where they spend the winter. Control of the pistol casebearer may be obtained during early July, when only eggs and young larvae are present on the trees, and the preblossom period, when the overwintering larvae are feeding on the opening leaf and flower buds. Orchardists should consider cost of materials, labor costs for special spray applications, and prevalence of other apple insects and of apple scab in the spring when deciding whether to attempt control. The orchardist may make two applications of 1 gal. of summer oil to 100 gal. of water and one application of 1 gal. of summer oil and 1 pt. of nicotine to 100 gal. of water during early July at the peak of egg laying. Treatment with one application of oil and nicotine applied during the peak of hatching is effective since the oil kills unhatched eggs and the nicotine kills young larvae. During the preblossom period control can be obtained with one application of 4 lb. of derris powder and 8 lb. of wettable sulfur to 100 gal. of water. The preblossom period is usually a critical period for scab control, and wettable sulfur is less effective for this disease than summer strength liquid lime-sulfur.

Ethylene dichloride emulsion and paradichlorobenzene crystals in peach tree borer control, M. L. Bobb (*Va. State Hort. Soc. Rpt., 47 (1942), pp. 34–40*).—In the experimental work reported excellent control of peachtree borers was obtained with ethylene dichloride emulsion and with paradichlorobenzene crystals, the former being slightly more effective. No injury to the peach trees resulted from either of these materials when the recommended dosage and dilution was used. Larger than recommended dosages of ethylene dichloride emulsion on 3-year-old trees treated in 1941 resulted in slight injury to the outer bark. Slight injury was caused to the bark of 15-year-old trees treated with a 50-percent and an 85-percent ethylene dichloride emulsion in 1942.

Airplane dusting of sugarcane with synthetic cryolite for control of second-generation borers, J. W. Ingram, E. K. Bynum, W. E. Haley, and L. J. Charpentier. (U. S. D. A.). (*Sugar Bul., 21 (1943), No. 17, pp. 129–131*).—Airplane dusting experiments on two Louisiana plantations in 1942 indicate that such dusting with synthetic cryolite for control of the second-generation sugarcane borer is fully as effective as ground dusting.

El gusano chupador de la caña de azúcar ("Diatraea saccharalis" (Fabricius)) en Tucumán [The sugarcane borer in Tucuman], K. J. Hayward (*Bol. Estac. Expt. Agr. Tucuman, No. 38 (1943), pp. 25, illus. 17*).

Biology of the holly leaf miner, A. Hartzell (*Contrib. Boyce Thompson Inst., 13 (1943), No. 1, pp. 17–27, illus. 4*).—Report is made of a study of the holly leaf miner, the most serious insect enemy of holly, conducted near Yonkers, N. Y. While *Ilex opaca* is its principal host, the miner attacks several other species of the genus, including *I. aquifolium*. It is single-brooded in the latitude of Yonkers. Passing the winter in the mines usually as a larva, pupation occurs with the first growth of the holly in the spring. The adults emerge in May and June and oviposit in the leaves. The eggs hatch in 4 or 5 days. The larval period extends from the middle of June to the latter part of March; the pupal period requires about 1 mo., and the adults emerge the first part of May. Aside from an unidentified fungus which attacks the pupa, no predaceous or parasitic enemies of the holly leaf miner were observed.

A list of 28 references to the literature cited is included.

Control of the holly leaf miner, A. Hartzell, D. L. Collins, and W. E. Blauvelt. (Cornell Univ.). (*Contrib. Boyce Thompson Inst., 13 (1943), No. 1, pp. 29–33, illus. 1*).—It is concluded from the data obtained in spray experiments in relation to the seasonal history of the holly leaf miner that with a moderate to heavy infestation one application of any of the materials tested could not be expected, except by chance, to produce adequate control of the holly leaf miner, due to the difficulty in timing the spray. Three applications of nicotine sulfate and fish oil gave good control, and this was not appreciably improved by the addition of lead arsenate. It is thought that two applications would be sufficient in a normal year, if one is made 2 or 3 days before the peak and the other 2 or 3 days after the peak of emergence of the adult flies.

Spraying schedules for apple orchards in northern New Mexico, J. R. Eyer and G. W. Schneider (*New Mexico Sta. Bul. 303 (1943), pp. 35, illus. 12*).—In San Juan County the codling moth has two generations, although the second may be considered "partial" because a number of first-generation larvae fail to pupate and do not transform to moths until the following spring. The pause or break between the flight periods of the first and second generations occurs in late June or early July, but is less distinct in the northern part of the valley. The generations are characterized by one or more periods of moth activity, and large numbers may be captured in bait pails. Sprays are more effective if applied to conform with these periods of activity, and bait pails are recommended to be used by orchardists for this purpose. Cool weather, particularly during May and June, delays and prolongs moth emergence, and bait pails often fail to attract sufficient numbers to serve as a reliable indicator for the timing of first-brood cover sprays. Warm weather or heavy rains also decrease catches by bait pails. Trap bands, which will provide a reliable index to the rate of pupal emergence, are suggested to supplement bait pail observations. A 10–20-day interval occurs between the first peak of moth activity in the spring and the hatching of eggs, which may be used as the average interval to allow between the calyx and first cover sprays. A second cover spray should be applied from 10 to 14 days after the first. Oil, which acts as an ovicide, should be used in both of these cover sprays. A 30–45-day interval occurs between the application of the second cover spray and the first peak of second-brood moth flight. This interval is consistent in the southern half of the apple-growing area and serves as a rough criterion for determining the proper time to apply the first spray for the second generation. Six cover sprays are recommended for the southern and at least five for the northern part of the valley.

Codling moth control, L. Jenkins, H. E. Brown, C. W. Wingo, W. W. Smith, and L. Haseman (*Missouri Sta. Bul. 459 (1942), pp. 18, illus. 4*).—A practical account.

Comparative efficacy of different culicifuges under laboratory conditions. D. N. Roy, S. M. Ghosh, and R. N. Chopra (*Parasitology, 34 (1942), No. 2, pp. 152–154*).

Further work on the comparative efficacy of different culicifuges under laboratory conditions, D. N. Roy, and S. M. Ghosh (*Parasitology, 34 (1942), No. 3–4, pp. 291–294*)—In continuation of the above, the authors present tabular information on the culicifuge action of other substances often recommended.

New species of Parasyntormon from the United States (Diptera: Dolichopodidae), F. C. Harmston and G. F. Knowlton. (Utah Expt. Sta.). (*Canad. Ent., 75 (1943), No. 4, pp. 63–65*).—Four species belonging to the genus *Parasyntormon* from Utah are described as new to science.

Some notes on the biology of the pack rat cuterebrid (Cuterebrid beameri Hall) in Kansas, R. H. Beamer, L. R. Penner, and C. W. Hibbard (*Jour. Kans. Ent. Soc., 16 (1943), No. 2, pp. 47–50, illus. 9*).—This contribution relates to a species of Cuterebridae which infests pack rats (*Neotoma floridana osagensis*) in Kansas, where there are two generations of flies a year. From one to five larvae have been found in one rat. This cuterebrid lays its eggs at random in and over the entrance to the rat nests. The rapidity with which the wounds caused by the larvae in the rats heal is remarkable.

A survey of British sheep blowflies, J. MacLeod (*Bul. Ent. Res., 34 (1943), No. 1, pp. 65–88, illus. 4*).—Report is made of the results of a 4-yr. survey of the species concerned in sheep myiasis throughout the British Isles, in which over 1,000 cases of strike were investigated. "In all regions, *L[ucilia] sericata* is the principal maggot fly. In Scotland, Northern England, and North Wales, *L. caesar* is an important species. *Phormia terraenovae* has much the same distribution, as a striking species, as *L. caesar*, except that it apparently does not strike sheep in North Wales. In the areas where it occurs it follows *L. caesar* in importance. These two species are apparently capable of acting as primary flies. *Calliphora erythrocephala* and, more rarely, *C. vomitoria* occur fairly generally over the country but only in very low incidence. Larvae of *Muscina* spp. have been recovered from only 3 cases, 1 each in Scotland, England, and Ireland. The two closely related species, *L. caesar* and *L. illustris*, have only been separated in a few instances, and there is not sufficient evidence for the latter species, but it would seem to be more common in lowland areas than in the north and west."

On the life history of Synthesiomyia nudiseta van der Wulp (Diptera: Muscidae), a myiasis-producing fly, L. B. SIDDONS and D. N. ROY (*Parasitology, 34 (1942), No. 3–4, pp. 239–245, illus. 19*).

Control of Mexican bean beetle and bean leaf beetle, S. MARCOVITCH and W. W. STANLEY (*Tennessee Sta. Cir. 85 (1943), pp. [4], illus. 6*).—A practical account.

The Coccinellidae or ladybeetles of the Koebele collection, I, P. H. TIMBERLAKE (*Hawaii. Planters' Rec. [Hawaii. Sugar Planters' Sta.], 47 (1943), No. 1, pp. 1–67, illus. 33*).

Potato flea beetle control experiments in western Nebraska in 1940, H. D. TATE. (Univ. Nebr.). (*Nebr. Potato Impr. Assoc. Ann. Rpt., 22 (1941), pp. 7–10*).—A progress report on field tests of the most promising insecticides for control of the potato flea beetle, the details being given in tables.

Potato flea beetle development and its relationship to control in the North Platte Valley, R. E. HILL. (Univ. Nebr.). (*Nebr. Potato Impr. Assoc. Ann. Rpt., 22 (1941), pp. 5–7*).

Potato flea beetles and their control in eastern Washington, B. J. LANDIS (*Washington Sta. V Cir. 9 (1943), pp. 4, illus. 2*).—A practical account.

Make preparations now, poison weevils when fruiting is heavy, damage serious, C. LYLE (*Miss. Farm Res. [Mississippi Sta.], 6 (1943), No. 5, p. 1*).—A practical account.

Queens bred for resistance to American foulbrood, O. W. PARK. (Iowa Expt. Sta.). (*Amer. Bee Jour., 83 (1943), No. 6, p. 237*).

A new spider mite on citrus in southern California (Acarina: Tetranychidae), E. A. MCGREGOR. (U. S. D. A.). (*Ent. Soc. Wash. Proc., 45 (1943), No. 5, pp. 127–129, illus. 8*).—*Tetranychus lewisi* taken from fruits of navel orange at Corona, also collected from lemon fruits at Whittier, is described as new. Females of this species when transferred from navel oranges to tender lemon leaves in Mungar cages and kept at room temperatures varying from 62° to 73° F. seem to thrive. They commenced ovipositing less than 24 hr. after issuance and during the period of rearing deposited an average of five eggs per day. The average duration of the stages in developing females were as follows: Incubation 6 days, larval stage 2, first stage nymph 2, and second stage nymph 2 days. The time required from egg deposition to the emergence of the female was 12 days. The development of male individuals required 1 or 2 days less, due to the omission of one nymphal instar. The mites form a loose canopy of webbing under which they live. All stages are capable of spinning these fibrils. In feeding, either on the fruit or the leaf, pigment is extracted which results in a stippling of the rind and epidermis with paler spots.

Petunia, an important winter host of the tomato mite, A. E. MICHELBACHER (*Pan-Pacific Ent., 19 (1943), No. 2, p. 73*).—Record is made of the overwintering of *Phyllocoptes destructor* Keifer in large numbers on petunia in the vicinity of Woodland, Calif.

ANIMAL PRODUCTION

The conservation of alfalfa, red clover, and timothy nutrients as silages and as hays, II, O. M. CAMBURN, H. B. ELLENBERGER, C. H. JONES, and G. C. CROOKS (*Vermont Sta. Bul. 494 (1942), pp. 40*).—Continuing these studies (E. S. R., 87, p. 843), the conservation of first- and second-cutting alfalfa, red clover, and timothy was investigated. As ensiled, the dry matter contents ranged from 27 to 33 percent for first-cutting alfalfa, 30 to 35 for red clover, 32 to 36 for early-cut timothy hay, 27 to 28 for second-cutting alfalfa, and 43 to 48 percent for late-cut timothy. In the preservation as silage or sun-cured hays, the average loss of dry matter was 20 percent, but when preserved by artificial drying the dry matter loss averaged 5 percent with the several crops. Except in case of fat, the nutrients were somewhat more digestible from hay than from silage. The presence of ether-soluble fermentation products in silage is given as the reason for its higher digestibility in this feed. Molasses nutrients in excess of those needed for silage fermentation were well conserved. The recovery of nutrients in hays was greater than in silages, probably because of the excessive surface spoilage in the small trial silos. Artificial curing was superior to natural curing of hay for the preservation of nutrients, but with ideal weather conditions sun curing may be an efficient method of conserving nutrients of grass. Silage was the form preferred for the preservation of carotene, but no method of ensiling, with or without molasses or phosphoric acid, was outstandingly better for carotene retention. After 8 mo. of storage sun-cured hays had lost about 85 percent, artificially dried hay 47, and silage 38 percent of their initial carotene contents. Adverse weather conditions rapidly increased the rate of carotene destruction under natural curing conditions. In arriving at these conclusions, data are reported on the ash, protein, fiber, fat, and carotene compositions of samples of these crops at different cuttings and after preservation as hay or silage in experimental silos of 4 by 12 ft. or larger silos 10 by 24 ft. with samples placed in bags at specified sections within the silos. Digestion trials were conducted with dairy cows or 2-year-old heifers. The silage preservatives added were 2, 4, or 8 percent of molasses or 0.75 percent of phosphoric acid.

The nutritional significance of grass, C. A. Elvehjem and H. A. Sober. (Univ. Wis.). (*Chron. Bot.*, *7* (*1943*), *No. 7, p. 301–303*).—A review (15 references) summarized by the statement that "dried young cereal grasses contain appreciable amounts of many of the well-known nutrients and are also rich in unknown factors which need further study. This entire subject is a fertile field for further research."

Commercial feeding stuffs from September 1, 1941, to August 31, 1942, F. D. Fuller and F. D. Brock (*Texas Sta. Bul. 620* (*1942*), *pp. 256*).—The guaranteed and found analyses of 3,645 samples of feeds chemically and microscopically examined in Texas during the year ended August 31, 1942 (E. S. R., 87, p. 405) are presented. The potency of vitamins A and D of 28 samples of fish-liver oils and the carotene content of 57 feed samples were ascertained. About 800 determinations were made of the salt and lime content of mixed feeds. The hardness of 26 samples of cottonseed cake was determined by analysis.

Nutrition for breeding herds and flocks, A. G. Hogan (*Missouri Sta. Cir. 256* (*1943*), *pp. 8, illus. 5*).—A general statement of the nutritive requirements of livestock and poultry and suggestions for complying with these needs.

Meeting wartime beef production goals, C. S. Hobbs et al. (*Oklahoma Sta. Cir. 112* (*1943*), *pp. 12, illus. 1*).—General directions for improved beef production, with maximum use of roughage and pasture and with efficient management and marketing practices.

Cattle feeding experiments, 1938–1939, 1939–1940, 1940–1941, 1941–1942, F. H. Leinbach (*Maryland Sta. Bul. A20* (*1942*), *pp. 251–269+, illus. 4*).—Similar results were obtained in 1938–39 and 1939–40 when distillers' rye dried grains, with and without cane molasses, replaced part of the shelled corn and cottonseed meal. Gains of about 2 lb. per head per day were made in both years, and a value was assigned of 73.44 percent that of U. S. No. 2 shelled corn. Slightly less feed per unit of gain was required with the distillers' rye dried grains. In the second year, the amount of feed was slightly greater per unit of gain in 192 days than in the first year's test of 144 days. Cane molasses at the rate of 3 lb. per steer per day made the distillers' rye dried grain ration more palatable, and the steers stayed on feed better and showed improved finish. As a substitute for a portion of the corn, "stilage" (distillers' slop) proved of little value. In other comparisons of crushed barley and shelled corn, the rates of gain in about 250 days were similar, but the feed cost was lower for barley-fed steers. In two trials of approximately 250 days' duration, corn silage was worth about half as much as hay. These studies were conducted over 4 yr. with 4 lots of 10 steers each year.

Good pasture and roughage in fattening cattle, E. A. Trowbridge and A. J. Dyer (*Missouri Sta. Bul. 466 (1943), pp. 12, illus. 14*).—Beef calves averaging 425 lb. live weight made gains averaging 99 lb. in a 128-day wintering period on legume hay, corn silage, and winter pasture. During the following 177 days on wheat and lespedeza pasture the cattle made average daily gains of 1.57 lb. These steeers lost an average of 44 lb. from October 21 to December 13 on bluegrass. During a dry-lot feeding period of 130 days on corn silage and legume hay, the 2-year-old steers made average daily gains of 1.53 lb. In the following summer these 2-year-old steers gained an average of 1.07 lb. per day during 219 days on small grain and lespedeza and barley pasture. Most of these steers were fat enough for killing cattle. As long 2-year-olds they were wintered for 98 days with average daily gains of 1.04 lb. on Atlas sorgo and alfalfa hay. As the age of the cattle increased, the time and grain required in dry-lot feeding to produce carcasses that graded good decreased. The amounts of time allowed for finishing on corn, cottonseed meal, and legume hay, with and without silage and after feeding on roughages and pasture, were calves 168 days, yearlings 130, 20-month-old steers 112, 28-month-old steers 77 and 63, 30-month-old steers 35, and 3-year-old steers 42 days. One lot of cattle produced carcasses which graded middle good when marketed off pasture at about 30 mo. of age with no grain being fed with the corn silage and hay rations. Maximum returns from pasture can be expected when efficiently utilized.

Protein supplements for fattening cattle, R. R. Thalman (*Nebraska Sta. Bul. 345 (1943), pp. 26*).—The gains and selling price of calves, yearlings, and 2-year-old steers were increased by supplements of cottonseed meal to a ration of shelled corn and alfalfa hay. It was estimated in two trials with 2-year-olds, three with yearlings, and one with steer calves that 1 ton of cottonseed meal saved approximately 37.3, 46.77, and 22.64 bu. of corn and 1.33, 0.4, and 0.028 tons of alfalfa hay, respectively. In one experiment with corn silage with yearling steers, addition of 1 ton of cottonseed meal was calculated to replace 1.84 tons of corn silage, 0.34 ton of alfalfa hay, and 43.91 bu. of corn in a 165-day test. In one experiment with heifer calves, the addition of 1.86 lb. of linseed meal daily to a ration of shelled corn and alfalfa hay resulted in increased gain and fatter calves than when no additionl protein supplemental feed was provided. The replacement value of linseed meal varied widely in three experiments with 2-year-old steers, but with yearling steers in a 165-day feeding period 1 ton of linseed meal replaced 2.78 tons of corn silage, 0.22 ton of alfalfa hay, and 51.5 bu. of corn. Somewhat larger gains were made with groups of steer calves with cottonseed cake than with tankage or soybean cubes, but there was little difference in the economy of the gains of those receiving the last two protein supplements. A slight advantage was shown in the selling price of heifers fed cottonseed meal than those on soybean meal, but there was little difference between the feeding value of old-process and solvent-process linseed meals. The conclusions are based on lots of from 8 to 20 head of cattle.

More carotene, palatability, food value after urea-treatment of sorghum silage, A. E. Cullison (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 4, p. 8*).—A group of 15 Hereford and Angus cows maintained weight during a 78-day period on a daily ration of 5 lb. of Johnson grass hay and 35 lb. of sweet sorghum silage on which there had been sprinkled 10 lb. of urea per ton. In contrast, 15 cows receiving comparable amounts of untreated silage lost an average of 47 lb. per head. Analysis showed the urea-treated silage to contain 34.55γ of carotene per gram after 4 months' storage, but the untreated silage had only 22.67γ per gram. There was a further loss in carotene during the next 6 weeks in the untreated lot.

Castrating and docking lambs, D. A. Spencer and E. W. Baker (*U. S. Dept. Agr., Farmers' Bul. 1134, rev.* (*1943*), *pp. 8+, illus. 9*).—A revised edition (E. S. R., 44, p. 73), with descriptions of the more advanced methods.

Shearing in summer increases gains (*Res. and Farming* [*North Carolina Sta.*], *1* (*1943*), *Prog. Rpt. 2, p. 9*).—The practice of shearing early lambs in June was beneficial from the standpoint of greater gains, more vigor, and less death losses during the hot summer months for ewe lambs retained in the flock.

Some factors influencing efficient production of sows, L. A. Weaver and R. Bogart (*Missouri Sta. Bul. 461* (*1943*), *pp. 16, illus. 6*).—Data collected during 1938–42 on the university and collaborating herds in the swine improvement project showed that within limits (9–13) large litters resulted in more pigs and greater total weights of pigs raised to weaning than with smaller litters. Among 40 gilts bred twice in the same heat period, 90 percent conceived with an average of 8.2 pigs per litter, as contrasted with a 72-percent conception with 7.1 pigs per litter for one service. Similar results were obtained with artificial insemination once and twice. The birth weight of pigs in large litters was not as great as birth weights of those born in smaller litters, and mortality at birth in the large litters was greater. Pigs with heavy weaning weights made more rapid gains than those with smaller weaning weights. Efficiency of feed utilization was greater in litters of more than 10 than when fewer numbers were raised.

Effect of amount and kind of protein in swine feeding, F. B. Headley. (Coop. U. S. D. A.). (*Nevada Sta. Bul. 164* (*1943*), *pp. 17, illus. 7*).—In continuation of the series of studies on swine feeding (E. S. R., 83, p. 809), three groups of eight 9-week-old pigs on barley rations supplemented with skim milk and alfalfa meal in one lot, a protein mixture (fish meal, linseed meal, and alfalfa meal) in a second group, and both skim milk and the protein mixture in the third group made in 18 weeks average daily gains of 1.22, 1.24, and 1.33 lb., respectively. It is concluded that the skim milk and the protein mixture each added some growth factor which was not present in the other feed. In another experiment with three groups of eight 41-lb. pigs, barley and skim milk were fed with alfalfa pasture and supplements of 2, 4, and 8 oz. per head per day of the protein mixture. During 112 days, average gains of 156±3.6, 167±3.8, and 162±5.6 lb. were made. There appeared to be no advantage in increasing the protein supplement above 4 oz. per pig per day. Other experimental groups of about 10 pigs on the barley, protein mixture, and skim milk rations made average daily gains of 1.32 and 1.43 lb. in 112 days when hand-fed and self-fed, respectively. In a fourth experiment of 115 days' duration, there was no advantage in feeding more than 4 oz. of the protein supplement. Self-fed pigs made somewhat greater average daily gains than hand-fed pigs.

Feeding soybeans to pigs, E. H. Hostetler, W. J. Peterson, and A. O. Shaw (*Res. and Farming* [*North Carolina Sta.*], *1* (*1943*), *Prog. Rpt. 2, p. 6. illus. 1*).—Evidence points to a deficiency in raw soybeans of essential amino acids, probably cystine and methionine, for pigs. The deficiency of a ration of 78.5 percent raw soybeans was not met by supplements of 5 percent tankage, 6.5 percent cottonseed meal, 7.5 percent alfalfa, and 2.5 percent minerals. Better gains resulted when soybean meal or cooked soybeans replaced the raw product.

A study of the nutritional value of wheat germ products for swine, II, E. W. Crampton (*Sci. Agr., 23 (1942), No. 3, pp. 161–171*).—Confirming previous findings (E. S. R., 86, p. 516), wheat-germ oil added to the ration had no significant effect on pregnant sows or on the weights and growth of the pigs produced in litters of eight sows. Size of the litter and sex seemed to be more important factors in growth and mortality than the type of ration.

Indiana stallion enrollment.—Report of stallion enrollment board for the year 1942, with lists of stallions and jacks enrolled (*Indiana Sta. Cir. 282 (1942), pp. 38, illus. 1*).—The usual report of the stallions and jacks enrolled in 1942 for service in Indiana (E. S. R., 88, p. 800), with general information.

The digestibility of some high protein feeds by foxes, S. E. Smith. (Cornell Univ.). (*Amer. Fur Breeder, 15 (1943), No. 10, pp. 10, 12*).—Continuing studies of the digestibility of feeds by foxes (E. S. R., 86, p. 79), the proteins of blood meal, linseed meal, meat scrap, and soybean meal were less well digested by adult foxes than the protein of frozen horse meat, fish meal, and liver meal. The rations consisted of 55 percent of horse meat or the replacement of about one-half of the protein from horse meat by the proteins of these feeds. Each test consisted of a 5-day collection period following a 3-day preliminary study with three foxes selected from seven adults.

Producing rabbits for meat, R. Bogart (*Missouri Sta. Cir. 269 (1943), pp. 12, illus. 10*).—A practical account of the raising and marketing of rabbits as a war emergency effort.

Korean lespedeza seed as a protein supplement in chick rations, M. R. Irwin and H. L. Kempster (*Missouri Sta. Bul. 462 (1943), pp. 11*).—Whole lespedeza seed was a satisfactory substitute for portions of the dried milk and meat scrap in chick starter rations up to 13 percent at 6 weeks of age. In one of three experiments, chicks on a ration of 2 percent dried milk, 8 percent meat scrap, and 13 percent lespedeza seed, weighed averages of 313 and 296 gm. (males and females), as contrasted with 284 and 227 gm. on a ration consisting of 10 percent meat scrap and 5 percent dried milk. When lespedeza seed up to 25 percent of the ration plus 2 percent meat scrap constituted the protein supplement, the birds weighed an average of 320 and 224 gm. (males and females), but they showed diarrhea and the droppings adhered to the down. In another experiment, lespedeza seed fed free choice increased growth and more efficient gains were produced but small amounts of lespedeza seed were consumed. In a third trial, 5, 10, 13, 15, and 25 percent lespedeza seed were included in rations with dried milk and meat scrap. In all the rations with lespedeza seed the chicks were heavier and the ration proved more economical than where no lespedeza seed was included. The droppings were again sticky when 25 percent lespedeza seed was included. In another experiment whole lespedeza seed proved satisfactory as a substitute for soybean meal when fed at levels not exceeding 15 percent.

Value of a fermentation by-product in poultry feeds, A. C. Groschke and H. R. Bird (*Maryland Sta. Bul. A6 (1941), pp. 145–172+, illus. 2*).—"Curbay B-G," a commercial feed produced as a byproduct of blackstrap molasses fermentation in the manufacture of butanol and acetone, when added at levels of 0, 0.5, 1, 2, and 4 percent to a low-cost or standard basal ration or as a substitute for dried skim milk in the station ration of chicks, showed a slight tendency to suppress growth up to 2 weeks of age. After this period there was a marked stimulation of growth with each additional increment of the product. Despite the good growth obtained with the higher levels of Curbay B–G, nutritional curled-toe paralysis occurred in all the groups with the smaller amounts of wheat and oats, and without alfalfa leaf meal and dried skim milk. With those receiving 0, 0.5, 1, 2, and 4 percent levels of Curbay B–G, there occurred 28.5, 14.2, 4.7, 14.2, and 14.2 percent, respectively, of curled-toe paralysis, indicating a need for riboflavin. When used as a supplement and as a substitute for milk, Curbay B–G produced its maximum benefit on growth at 6 weeks of age with levels of 3–4 percent. Considering the weights and feed required per unit of gain, feed efficiency in one experiment increased as the level of Curbay B–G increased as a substitute or supplement to milk, but in the last two experiments levels of 1–2 percent of Curbay B–G proved most efficient. At the levels used, Curbay B–G did not cause watery or excessively moist droppings. The study was conducted in three experiments carried out in triplicate with 14 lots of 20–21 Barred Plymouth Rock or Barred Plymouth Rock × New Hampshire chicks fed to 11 weeks of age. The results with low-cost diets, with and without Curbay B–G, in 10 further groups conclusively showed that growth was considerably improved by Curbay B–G supplements. The mash should contain 5 percent of alfalfa leaf meal. The levels of fish meal could be reduced to 4 percent, and soybean meal increased to 24.5 percent, but, as the only supplement, the efficiency of feed utilization was lowered.

In another experiment, the hatchability of eggs laid by Barred Plymouth Rock pullets receiving milk-free mash with alfalfa meal supplemented with 3 percent Curbay B–G was equal to or better than the hatchability of eggs laid by these and other pullets on rations containing 6 percent of dried skim milk. These results indicated that a factor or factors needed for hatchability other than riboflavin was present in alfalfa leaf meal of good quality and perhaps to a lesser extent in dried skim milk. Incubation of the eggs from 4 lots of 15 Barred Plymouth Rock pullets, with and without supplements of Curbay B–G or dried skim milk to the basal ration for 6- to 8-week periods from December to June, showed that a factor other than riboflavin needed for high hatchability was present in alfalfa.

Defluorinated rock phosphate may replace bone meal in laying rations, R. J. Evans and J. S. Carver (*Washington Sta. V Cir. 6 (1943), pp. 4, illus. 2*).—Defluorinated rock phosphate gave as satisfactory results as bonemeal when supplying equal amounts of phosphorus. Egg production decreased with less than 0.8 percent of phosphorus.

A factor in oat hulls essential for the growth of chicks, P. R. Record. (Coop. Ohio Expt. Sta.). (*Iowa Sta. Res. Bul. 312 (1943), pp. 489–512*).—Oat hulls were found to contain some factor or factors present in dried skim milk or dried buttermilk, probably identical with the alcohol-precipitate factor found in dried brewers' yeast to be essential for nutrition of the chick by Schumacher and Heuser (E. S. R., 84, p. 514). The amount of the factor present was probably controlled by the manufacturing process. Additions of 20 percent oat hulls or 5 percent yeast to rations of cereals, dried milk products, cod-liver oil, and minerals caused increased growth of chicks. Increased bulk was not the responsible factor, as spruce pulp and regenerated cellulose caused increased feed consumption but did not produce increased weight in the 8-week test. The increased growth from 5 percent yeast was approximately equal to that from 20 percent oat hulls. The additional growth was somewhat greater on dried skim milk than on dried buttermilk rations. Amounts of 2.5 percent brewers yeast stimulated growth, but 5 percent yeast or 0.15 percent choline was needed as a supplement to the Cornell ration to prevent perosis. Study of the activity of fractions of the oat hulls showed that the active principle was partly soluble in water and precipitated by ethanol. A 50-percent ethanol extraction of oat hulls had a growth-stimulating effect similar to that from the alcohol-precipitate factor. The activity of the alcohol extraction of the residue showed that all the growth-promoting factor or factors were not removed by water extraction. Beneficial effects on growth were obtained from the replacement of peanut meal by soybean meal and from supplements of wheat bran. The number of Single-Comb White Leghorn chicks on the different rations with the varied supplements ranged from 15 to 20. These supplements were added to the Cornell ration and other rations, oat groats and skim milk, corn and casein, and meat scrap.

Relation of vitamin A to egg production and hatchability, M. Rubin and H. R. Bird (*Maryland Sta. Bul. A12 (1942), pp. 339–350+*).—There appears to be no justification for adding extra quantities of vitamin A to the ration over and above that contained in good laying mashes. Although egg production was decreased to almost zero, there was no appreciable effect on hatchability of the eggs, produced by the hens on the deficient rations. In another experiment confirmatory results were obtained with 350, 550, and 750 µg of carotene per 100 gm. of the ration. Analyses of the livers from these hens fed up to 11 weeks on the deficient ration with the supplements showed only traces of vitamin A when the hens received the smallest amount, whereas it was increased to 3,825–9,945 blue units of vitamin A per liver when the hens received the largest amount of carotene.

Egg yolk colour as influenced by salmon oils in the diet, S. J. Slinger, H. D. Branion, and F. N. Marcellus (*Sci. Agr., 23 (1942), No. 3, pp. 180–182*).—There was no significant difference in the egg yolk color readings by the Heiman and Carver method (E. S. R., 75, p. 243) of the eggs laid by 6 groups of 24 hens after 2 weeks and 1 mo. on rations containing 0.25 percent of cod-liver oil or 1 percent of salmon oil of two kinds, 1 percent of salmon egg oil, or 0.25 and 1 percent of commercial feeding oils. Some seasonal variation in the yolk color was suggested from birds receiving no salmon oil in their diet.

DAIRY FARMING—DAIRYING

Evidence of the synthesis of vitamin C by dairy cows, G. C. Wallis. (S. Dak. Expt. Sta.). (*Jour. Dairy Sci., 26 (1943), No. 5, pp. 401–408*).—Although there was some variation in the vitamin C in the blood plasma and milk of cows receiving different amounts of vitamin C in the ration, there were no consistent differences between five cows on a low vitamin C ration; two on an alfalfa and grain ration; six on alfalfa hay, silage, and grain; and five cows on pasture with a grain supplement. There was no evidence that the vitamin C-low-ration cows were suffering from vitamin C deficiency, although the ration was fed from 3 to 4 yr. In six 24-hr. vitamin C balances with three cows on low vitamin C rations, the outgo of this vitamin far exceeded the intake. The site of the probable synthesis of the vitamin was thought to be the gastrointestinal tract beyond the rumen, since fecal outgo was great and urine elmination small. The outgo in the milk depended on the amount of milk produced, which varied from 0 to about 50 lb. per day.

Feeding calves on whole milk and skimmilk, A. E. Tomhave and T. A. Baker (*Delaware Sta. Cir. 14 (1943), pp. 8*).—In two series of trials over a 16-yr. period 97 Holstein heifer calves were employed in 14 groups. These were fed whole milk or skim milk for various intervals of growth, but no significant differences were noted in the weights at 180 days. In these tests different groups were fed whole milk from 21 to 180 days of age. Skim milk was fed to 180 days of age when whole milk feeding was stopped earlier. No nutritional deficiencies were observed. A calf ration providing whole milk for 21 days and skim milk to 90 days furnished ample milk products for standard growth.

Weaning at birth and hand-feeding of kids, S. Sardar Singh Bhatia (*Indian Farming, 3 (1942), No. 10, pp. 543–544, illus. 4*).—In tests at two experimental farms 20 kids were hand-fed with about the same growth records and mortality as 20 naturally fed kids. The kids first received milk from a bottle at the rate of about 2 lb. per day during the first month with subsequent increases in grain and roughage.

The lipolytic activity of bovine mammary gland tissue, P. L. Kelly. (Ark. Expt. Sta.). (*Jour. Dairy Sci., 26 (1943), No. 5, pp. 385–399, illus. 3*).—In further studies of the enzyme relationship of the mammary gland to milk fat sythesis (E. S. R., 80, p. 95), the tissue of the bovine mammary gland possessed the power of hydrolyzing neutral fats if the gland had first been developed by pregnancy. Among a total of 29 mammary glands in various stages of development, tissue from glands undeveloped by pregnancy showed only traces of lipolytic activity, but the amounts of enzyme were considerably larger when the glands were removed from lactating animals. The pH of actively secreting glands tended toward the acid side. The actual secretory tissues were much more acid than the connective tissue cell areas.

Testing dairy products, C. C. Totman (*South Dakota Sta. Cir. 46 (1943), pp. 8*).—Methods of conducting tests of cream and various other dairy products are presented as well as suggestions for standardizing milk and cream.

Some microscopic technics for determining the bacteriological quality of milk, C. S. Bryan, W. L. Mallmann, and G. J. Turney (*Michigan Sta. Cir. 186 (1943), pp. 19, illus. 5*.—Directions are given briefly for the microscopic examination of milk samples to differentiate mastitic milk and faulty care in milk production by the presence of excessive numbers of thermoduric bacteria (E. S. R., 88, p. 674).

An evaluation of the visual mold test for cream, F. E. Nelson, W. H. Martin, R. W. Morrison, and W. J. Caulfield. (Kans. Expt. Sta.). (*Jour. Dairy Sci., 26 (1943), No. 5, pp. 375–384*).—Although the visual mold test does not show complete agreement with all criteria of cream quality, it showed sufficient agreement to furnish another reliable and recommended test of cream quality which can be made easily. General but not universal agreement was obtained between the visual mold score in 7 groups of about 1,380 samples of cream delivered at two Manhattan, Kans., cream stations and the mold plate count, yeast plate count, organoleptic grade of cream, titratable acidity, and age of the cream. Because of individual variations and differences in the relative influence of particular conditions, the visual mold test was considered at its best when used in the cream station on questionable and poor deliveries.

The rate of bacterial filtration and butterfat concentration in fresh milk during cooling, J. E. Nicholas, R. C. Montgomery, and T. G. Anderson. (Pa. Expt. Sta.). (*Refrig. Engin., 45 (1943), No. 5, pp. 334–335*).—Continuing the bacterial analysis and determination of the fat composition of different strata of milk (E. S. R., 88, p. 811), it was shown in milk samples withdrawn at 15-min. intervals from bottles stored in the water bath of an electric milk cooler that the fat globules began to separate apparently as soon as the milk was drawn. Bacterial filtration and cream separation were maximum between the first and second hours of cooling.

The lactic acid fermentation of streptococci under aerobic conditions, J. C. White and J. M. Sherman. (Cornell Univ.). (*Jour. Dairy Sci., 26 (1943), No. 5, pp. 371–374*).—Analyses of glucose media for lactic acid production by methods of Troy and Sharp (E. S. R., 74, p. 5) from 14 species and mixtures of streptococci showed that the metabolism was modified under aerobic and anaerobic conditions. When the medium containing 5 percent glucose was fully aerated, the percentage of lactic acid produced per unit of glucose was substantially lower than under anaerobic conditions. This was found with strains representing pyogenic, viridans, lactic, and enterococcic streptococci.

Storing frozen cream (a preliminary report), T. R. FREEMAN, L. E. MULL, and E. L. FOUTS (*Florida Sta. Bul. 383 (1943), pp. 24, illus. 2*).—A satisfactory quality of ice cream was made from cream as the single source of butterfat which had been stored up to 7 mo. at 0° F. and was relatively free from copper. In tests of the development of off-flavors in the cream and ice cream made from it, the conclusion was reached that Avenex, Avenex concentrate, and trypsin added to frozen cream at the rate of 1.5, 0.1, and 0.003 percent, respectively, were effective antioxidants. Homogenization, additions of ascorbic acid, hermetic sealing of the can, or a surface layer of ice were of doubtful value in the prevention of the development of oxidized flavor in the stored product. It appeared that ascorbic acid contributed to a custardlike or cooked flavor in the cream. The maximum intensity of oxidized flavor developing in frozen cream might occur at any time during the storage period. The change in Eh occurring during processing was of little value for the prediction of the keeping quality of stored cream. When copper was added to ice cream prepared from cream stored in this manner it developed an oxidized flavor rapidly, but copper additions of 1.5 p. p. m. greatly reduced the cooked flavor developing from pasteurization.

Contributions to the study of rancidity in Canadian Cheddar cheese, I, II (*Sci. Agr., 23 (1942), Nos. 2, pp. 131–134; 3, pp. 176–179*).

I. *Butyric acid clostridia in rancid cheese*, C. H. Castell.—Microscopical examination of 40 rancid Cheddar cheeses failed to show typical clostridial forms, but they were frequently observed when low dilutions of these cheeses were made in sterile water with incubation at room temperature. Sporulation was hastened by additions of small amounts of NH_4OH. Iodophilic clostridia were more prevalent in rancid than in nonrancid cheese, but the numbers were not considered sufficient to be a significant cause of rancid flavors.

II. *The growth of butyric acid anaerobes in Cheddar cheese*, C. H. Castell and O. R. Irvine.—The use of butyric acid anaerobes for inoculation of milk samples to be employed in Cheddar cheese manufacture showed no instances in which the bacterial counts were increased during a storage period of 2 mo. No differences followed additions of various aerobes and reductions in the percentage of salt. Since the silage organisms did not grow with the anaerobic bacteria, it did not appear that proximity to silage and inoculation with butyric acid anaerobes producing rancid flavors was likely.

The surface flora and the use of pure cultures in the manufacture of Limburger cheese, M. W. YALE (*New York State Sta. Tech. Bul. 268 (1943), pp. 21*).—The surface smears of Limburger cheeses from two factories yielded maximum yeast counts on the fourth day of ripening. In one factory, in which the temperature of the curing cellar was 70° F., the yeast count increased from 346,000,000 per gram on the second day to 900,000,000 after the fourth day of age. In another factory, in which the temperature of the storage cellar was 60°, the yeast count increased from 370,000,000 in 2-day ripened cheese to 6,300,000,000 in 4-day ripened cheese. In longer ripening periods there were gradual decreases in the yeast counts. Studies of 243 cultures of bacteria from the surface of cheese ripened on the shelves of two factories showed the predominant organism to be a gram-positive, nonchromogenic, non-spore-forming rod producing a marked alkaline reaction in litmus milk and which did not liquefy gelatin. The next most common organism was *Bacterium linens*, producing a light cream or deep orange growth on agar and a neutral or slightly alkaline reaction in milk and liquefying gelatin. Surface inoculation of Limburger cheeses made from raw milk with *B. linens* strains did not improve the quality compared to cheese held under good factory conditions. Trials in two factories indicate that the flavor of Limburger cheese was improved by additions of milk cultures of *B. linens* to pasteurized milk from which the cheese was made.

Use of rennet paste in making Romano type cheese, C. A. Phillips. (Univ. Calif.). (*Natl. Butter and Cheese Jour., 34 (1943), No 6, pp. 13–14, illus. 2*).—A total of 73 Romano type cheeses with a sharp piquant flavor and a chemical composition comparable to imported cheese were made from Holstein milk with a rennet paste. Cheese made with liquid rennet was almost totally lacking in the piquant flavor, which was thought to be due to the formation of volatile fatty acids, a high proportion of which should be soluble.

Methods for the home preparation of soft cheese, N. S. Golding and O. J. Hill (*Washington Sta. V Cir. 10 (1943), pp. 4*).—Methods for the preparation of cottage, Neufchatel, Gervais, and other types of soft cheeses.

The manufacture of cultured buttermilk and cottage cheese, E. L. Fouts and L. E. Mull (*Florida Sta. Bul 382 (1943), pp. 18, illus. 4*).—General directions for making churned and cultured buttermilk and cottage cheese, with special reference to the disposal of surplus skim milk. Schedules are suggested for the manufacture of buttermilk and cottage cheese.

VETERINARY MEDICINE

Medical parasitology, J. T. Culbertson (*New York: Columbia Univ. Press, 1942, pp. 285+, illus. 37*).

Studies in brucellosis, II. (Coop. U. S. D. A.). (*Michigan Sta. Tech Bul. 182 (1943), pp. 80, illus. 20*).—In reporting further, five papers are presented (E. S. R., 85, p. 529).

Electrophoretic studies of the proteins of bovine serums with respect to Brucella, C. L. San Clemente and I. F. Huddleson (pp. 3–44).—An account is given of the results of a study in which the new highly improved apparatus for electrophoretic analysis of colloidal mixtures, reported by A. Tiselius in 1937,[2] was employed. The studies were undertaken to (1) learn the fundamental differences that exist between the proteins in normal bovine serum and those in serums from animals which have been either treated or exposed to live *Brucella* cells or to some fraction therefrom, (2) identify the constituent of the serum with which *Brucella* antibody was associated, (3) learn something about the physicochemical nature of the antibody, and with this information (4) develop a suitable method of purifying and concentrating *Brucella* antiserum. Fifty-five references are listed to the literature cited.

The electrophoretic patterns of a series of normal and brucellosis-infected bovine serums were obtained, using the schlieren scanning method of L. G. Longsworth.[3] The mobilities and concentrations of electrophoretically distinct protein components were computed from those patterns. "The mobilities of the serums fall into four well-defined groups corresponding to albumin, α-, β-, and γ-globulins. The outstanding characteristic of the serum of a newborn calf was the extremely high concentration of α-globulin in contrast to a negligible or almost complete absence of γ-globulin. Within 4 hr. after the ingestion of colostrum by a normal calf the γ-peak might account for about 15 percent of the total protein, while in an infected calf the figure might rise to 30 or 40 percent. As measured by the agglutination procedure, agglutinins were evidently also absorbed. By the end of 2 weeks all protein components were in the relative concentration usually found in young heifers. Vaccination of calves with U. S. B. A. I *Brucella* strain 19 caused only a slight change in the normal serum distribution; even the slight increase in γ-globulin, along with the agglutinin titer, returned to normal within a month. No significant or permanent change could be demonstrated electrophoretically to explain the immunizing property of strain 19. The pattern of the vaccinated animal resembled the customary pattern of any young heifer.

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[2] Faraday Soc. Trans., 33 (1937), No. 4, pp. 524–531, illus. 10.

[3] Ann. N. Y. Acad. Sci., 39 (1939), pp. 187–202, illus. 9.

"The average mobility from a large number of various bovine serums for albumin, α-, β-, and γ-globulin was 6.2, 4.4, 3.0, and 1.6, respectively. From the same group the average relative concentration in percentage of each component with respect to total protein was found to be 42.4 for albumin, 18.3 for α-, 8.3 β-, and 31.1 for γ-globulin. A ratio greater than 0.8 for γ/A appeared to be significant immunologically. Using a uni-univalent system of buffers at different pH values and at a constant ionic strength of 0.1, the isoelectric points of the protein components of a bovine anti-*Brucella* serum were found to be 4.45, 4.98, 5.28, and 6.02 for albumin, α-, β-, and γ-globulin, respectively.

"Injection of a water-soluble crushed cell fraction at intervals into a horse and a cow caused an accumulating increase in total protein in both species. In contrast to the cow, the horse showed a tremendous increase of the γ-globulin, which attained a maximum area of 44.8 percent from an initial 30.1 percent, while that of the cow increased only to 28.5 from an initial 22.9 percent. Apparently the albumin concentration per unit volume of blood remained constant during the whole period of hyperimmunization despite a rise of more than 25 percent in total protein in the case of the horse.

"Absorption of an antiserum of high titer showed the γ-globulin to be the associate of *Brucella* antibody. Ammonium sulfate fractionation at a pH of 6 by diffusion through a rotating cellophane membrane succeeded in precipitating out all the γ-component including about 99 percent of the antibody at a salt concentration of 40-percent saturation. Ethanol introduced into antiserum in a similar manner but at 0° C. was less discriminate in the fractions precipitated. Under the conditions described, an alcohol concentration of 40 percent by volume failed to precipitate more than 50 percent of the antibody, while 30 percent alcohol precipitated more than three-fourths of the agglutinin content. A combination of the two protein precipitants offers the possibility of fractionating serum into components classified by Tiselius. After obtaining total γ-globulin in this way, further experimentation may yield a method further to purify and concentrate *Brucella* antibody."

The immunization of guinea pigs against Brucella infection, I. F. Huddleson (pp. 45–56).—Use was made of the Booth and Green bacterial crushing mill to obtain from live cells of *B. abortus* and *B. suis* a highly complex and soluble fraction which will actively immunize guinea pigs against *Brucella* infection.

"In 25 separate experiments totaling 247 guinea pigs, only 23 (9.03 percent) became infected after inoculation with virulent *B. abortus* organisms numbering from 152 to 3,840. Of 238 controls inoculated at the same time, 151 (63.44 percent) became infected. According to the 'Student t' equation there is a statistical difference of 15.11 between the percentages 63.44 and 9.03, which is highly significant. In 1 experiment consisting of 10 guinea pigs, a fraction prepared from *B. suis* protected 50 per cent of the injected pigs against *B. suis* infection. Of 10 controls exposed at the same time, all became infected. The results obtained with the crushed cell fraction show conclusively that it is not necessary to inject live *Brucella* organisms or for the organisms to multiply within the body of the host in order to produce an active immunity against brucellosis. When active immunity is produced by the bacterial-free fraction in the guinea pig there does not appear to be associated with the immunity any appreciable change in the concentration of the serum proteins or any noticeable increase in demonstrable serum agglutinins, even after exposure to infection. It is suggested that the name 'Brucellimmunin' be given to the bacterial-free immunizing fraction."

Catalase activity of the species of Brucella as a criterion of virulence, I. F. Huddleson and W. H. Stahl (pp. 57–63).—The authors show that the virulence of each of the three species of *Brucella* is directly related to the activity of the enzyme catalase contained in live cells. "Accuracy of the test depends upon the following factors: (1) The type of agar medium employed, (2) the period of growing the culture, (3) the degree of dispersion of the bacterial cells in the proper liquid, (4) the pH of the suspending liquid, (5) the method of standardizing the bacterial suspensions, (6) the temperature and time interval at which the test is conducted, (7) the rate of shaking the suspension, (8) the amount of H_2O_2 added, and (9) the necessity of using clean glassware. Cultures of each species, regardless of whether they be smooth or dissociated, fall into three zones of activity. The [*B.*] *suis* species is the most active or contains the largest amount of catalase, the [*B.*] *abortus* the least active, while [*B.*] *melitensis* falls in between the other two. The activity or amount of catalase in a given culture of each species decreases as the degree of dissociation increases and as the virulence of a smooth culture decreases. Rough and low virulent cultures of [*B.*] *melitensis* often show about the same activity as [*B.*] *abortus* cultures of high virulence. In view of those findings it is obvious one must first determine the species to which a given culture belongs before attempting to correlate virulence with the action on the enzyme."

A study of the virulence of Brucella abortus for the guinea pig and cow, L. M. Hutchings (pp. 64–78).—In the study reported the details are given in 23 tables. "A suitable suspending or diluting fluid for making plate counts of *Brucella* was prepared from 0.1 percent Tryptose and 0.5 percent sodium chloride in distilled water. The pH after sterilization was 6.9. Guinea pigs were readily infected with *B. abortus* and *B. suis* in very small numbers. Ten organisms were sufficient to produce infection in most of the guinea pigs. Continued passage of *B. abortus* through guinea pigs resulted in a slight increase in virulence of all cultures. Strain 19 B. A. I. exhibited the lowest virulence of any culture of *B. abortus* studied. Susceptible pregnant heifers were readily infected with 4,627,500 viable *B. abortus* organisms deposited in the conjunctival sac."

A study of Bang's disease in cattle in a large dairy herd, E. E. Hamann (pp. 79–80).—Of 58 cows with a *Brucella* serum agglutination titer above 1:100, 31 percent became permanent nonreactors during a 5-yr. period of study. There was a history of one or more abortions in 51 or 88 percent of the animals. In the same herd, only 2 of 23 cows classified as suspicious reactors became reactors in the same length of time, and no abortions occurred.

Microbial antagonism and Brucella abortus, W. Kocholaty (*Jour. Bact.*, *44* (*1942*) *No. 1, p. 143*).—Of the antibacterial preparations tested, pyocyanase, streptothricin (from the *Actinomyces lavendulae* type, isolated by the author from soil and dust), and penatin, produced by *Penicillium notatum*, appear to be highly bacteriostatic and bactericidal against *B. abortus* in vitro. While penicillin, also a product from *P. notatum*, has only very weak antibacterial properties against *B. abortus* and practically none against *Escherichia coli*, penatin is highly bacteriostatic and bactericidal against those two organisms and even more powerful against gram-positive micro-organisms, such as *Staphylococcus aureus*. Evidence has been offered that penicillin and penatin are by no means identical. As the crude culture filtrate of the mold-producing penatin considerably surpasses in its antibacterial action streptothricin and pyocyanase, most of the experiments conducted were carried out with the above-mentioned mold. The best culture conditions for the production of penatin were established. Using optimal culture conditions, 0.02–0.01 cc. of the crude culture filtrate in 10 cc. of agar will either strongly inhibit or completely suppress the growth of *B. abortus*, and an even smaller amount is sufficient to impede the growth of *S. aureus*.

Purification and properties of penatin, the second antibacterial substance produced by Penicillium notatum Westling, W. Kocholaty (*Arch. Biochem.*, 2 (*1943*), *No. 1, pp. 73–86*).—Description is given of a 1,000-fold purification of penatin, the second antibacterial substance produced by *P. notatum* (see above). "Highly purified penatin gives protein reactions and displays its antibacterial properties only in the presence of dextrose, which is decomposed by penatin with hydrogen peroxide formation. Penatin is highly bacteriostatic and bactericidal against many pathogenic and nonpathogenic micro-organisms, especially against gram-negative bacteria not appreciably susceptible to the action of penicillin. The production of penatin is suppressed by the addition of certain substances to the Czapek-Dox medium. Fairly large amounts of purified penatin can be tolerated by test animals when injected intramuscularly. There are indications that small amounts of penatin can be injected intravenously without obvious ill effects. Penatin is in all probability very similar to if not identical with notatin."

Penicillin B, an antibacterial substance from Penicillium notatum, E. C. Roberts, C. K. Cain, R. D. Muir, F. J. Reithel, W. L. Gaby, J. T. Van Bruggen, D. M. Homan, P. A. Katzman, L. R. Jones, and E. A. Doisy (*Jour. Biol. Chem.*, *147* (*1943*), *No. 1, pp. 47–58*).—Report is made of an antibacterial substance (penicillin B) produced by *P. notatum*, which is insoluble in lipid solvents but readily separated from the culture medium by adsorption on benzoic acid. It is differentiated from the product obtained by E. P. Abraham et al.,[4] here referred to as penicillin A, and may prove to be similar to the penatin of Kocholaty described above. "This substance appears to be protein in nature and differs markedly from the penicillin described by other investigators. The method of preparation, assay, and the properties of this substance are described. Although it is quite toxic to mice, it does not have a cumulative action, thereby permitting the repeated administration of small doses over a prolonged period. Extremely small amounts of this substance are bactericidal for both gram-positive and gram-negative organisms. This activity is dependent upon the presence of certain carbohydrates."

Penicillin B: Preparation, purification, and mode of action, J. T. Van Bruggen, F. J. Reithel, C. K. Cain, P. A. Katzman, E. A. Doisy, R. D. Muir, E. C. Roberts, W. L. Gaby, D. M. Homan, and L. R. Jones (*Jour. Biol. Chem.*, *148* (*1943*), *No. 2, pp. 365–378*).—In continuation of the report of earlier work noted above, experiments are described which show that penicillin B is an enzyme of a flavoprotein nature which causes the oxidation of glucose to gluconic acid and H_2O_2. Data presented in the previous publication indicated that glucose is necessary for the optimum antibacterial activity of this substance. The authors have now shown that the antibacterial activity is due to one of the products of the enzyme action, hydrogen peroxide. Apparently the inhibition of the activity of penicillin B by serum is due to catalase activity. That it is so effective in vitro is probably due to the fact that extremely small amounts of H_2O_2 are toxic to bacterial cells. Its use in vivo in areas where catalase activity is at a minimum is being investigated.

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[4] Lancet [London], 1941, II, No. 7, pp. 177–188, 189, illus. 8.

The effect of glucose on penicillin potency tests, A. G. LOCHHEAD and I. TIMONIN (*Canad. Jour. Pub. Health, 34 (1943), No. 1, p. 42*).—It has been found in tests of penicillin potency of culture fluids of *Penicillium notatum*, using the serial dilution method, that much higher values were obtained with 1 percent glucose broth than with plain broth used for growth of the test organisms (staphylococci). A less pronounced effect was obtained with sucrose, though lactose or mannose, used at the same concentration, were without effect. When added to actively growing broth cultures of staphylococci, glucose markedly increased the antibacterial action of penicillin, which effect may be bactericidal as well as bacteriostatic. This was noted in tests with culture fluids of the mold and with a preparation of penicillin powder. The antibacterial effect varies with the strength of penicillin, with the strain and concentration of the test organism, and with time. The results emphasize the importance of uniformity in procedure for evaluating penicillin.

Recovery of equine encephalomyelitis virus (western type) from human spinal fluid in Alberta, R. GWATKIN and I. W. MOYNIHAN (*Canad. Jour. Pub. Health, 34 (1943), No. 1, pp. 42–43*).—The western type of equine encephalomyelitis virus was recovered from cerebrospinal fluid on the tenth day of illness in a case in which recovery resulted. This recovery and the presence of both virus and neutralizing antibodies in the same sample of cerebrospinal fluid are considered of particular interest.

Fenómeno de para-inmunidad entre los virus de la encefalomielitis equina y de la rabia paralítica de Venezuela (A para-immunity phenomenon between the equine encephalomyelitis and paralytic rabies viruses of Venezuela), V. KUBES and F. GALLIA (*Bol. Inst. Invest. Vet. [Venezuela], 1 (1942), No. 3, pp. 81–100+; Eng. abs., pp. 99–100*).—A study made of the immunological relationship between two native heterologous viruses, namely, fixed bovine rabies virus and equine encephalomyelitis virus, is reported. "No cross-immunity was observed between the native rabies virus, on the one hand, and the encephalomyelitis virus, on the other. In return, the existence of a slight cross para-immunity, or nonspecific immunity between them, could be established. The above-mentioned para-immunity (nonspecific resistance) manifested itself in the form of a slight lengthening of life in mice vaccinated against either rabies or encephalomyelitis, when the latter were inoculated, along with unvaccinated controls, with the heterologous virus. Death was retarded, on an average, for 1 day. The intensity of the phenomenon has been more or less equal, whether using massive or limited m. l. d.'s of the heterologous virus. In contrast to what occurred on tests in vivo, the mentioned para-immunity was extremely weak or lacking altogether in serum tests in vitro. This would suggest that the phenomenon in question bears a greater relationship to tissue than to serum immunity (complete absence or limited quantity of heterologous antibodies in sera). Para-immunity is due, above all, to the virus antigens contained in the vaccines, since the latter fail to elicit it when the former are absent from them. However, there are indications that suspensions of brain or chick embryo from healthy individuals may also have a certain stimulating influence on the phenomenon. This may be thought to be due to the same cellular stimulation that plays a part in the mechanism of nonspecific protein therapy. Comparing the para-immunity stirred up by the antirabies vaccine with that due to the antiencephalomyelitis vaccine, the former was found to be more intense. Perhaps this is accounted for by a greater protein content in the antirabies vaccine. The possibility that the slight para-immunity demonstrated herein may comprise all the group of virus diseases is to be considered. The para-immunity phenomenon, as reported here, has no importance whatsoever in the field, but it may be of some value for the immunological differentiation of viruses in the laboratory."

A symposium on relapsing fever in the Americas, edited by F. R. Moulton (*Amer. Assoc. Adv. Sci., Pub. 18 (1942), pp. 130+, illus. 18*).—Included in this work under the heading of tick vectors are the following contributions: Tick Vectors and Life Cycles of Ticks, by G. E. Davis (pp. 67–76); Determination of *Ornithodoros* Species, by R. A. Cooley (pp. 77–84); The Longevity of Fasting and Non-fasting *Ornithodoros turicata* and the Survival of *Spirochaeta obermeieri* Within Them, by E. Francis (pp 85–88); and The Distribution of the Spirochete of California Relapsing Fever Within the Body of the Vector, *Ornithodoros hermsi*, by C. M. Wheeler (pp. 89–99).

Genetic constitutions of host and pathogen in mouse typhoid, M. R. Zelle. (Iowa Expt. Sta.) (*Jour. Infect. Diseases, 71 (1942), No. 2, pp. 130–152, illus. 4*).

The effect of para-aminobenzoic acid on the chemotherapeutic activity of the sulfonamides in lymphogranuloma venereum and in duck malaria, A. O. Seeler, O. Graessle, and E. D. Dusenbery (*Jour. Bact., 45 (1943), No. 3, pp. 205–209, illus. 1*).—Experimental work has shown that para-aminobenzoic acid inhibits the action of sulfamethyldiazine on *Plasmodium lophurae* infections in Peking ducklings, but does not affect the action of sulfanilamide and sulfamethyldiazine on lymphogranuloma venereum in mice.

Poisonous plants of Maryland in relation to livestock, G. B. Reynard and J. B. S. Norton (*Maryland Sta. Bul. A10 (1942), pp. 249–312+, illus. 35*).—This account, based upon several years' investigation of the poisonous plants of the State, is intended as a guide for livestock farmers, veterinarians, and agricultural leaders.

Notes on livestock poisoning in Connecticut, C. E. Shepard, E. M. Bailey, and D. C. Walden (*Connecticut [New Haven] Sta. Bul. 470 (1943), pp. 157–167, illus. 1*).—An account of some of the more important plants poisonous to live stock in Connecticut, their location, safeguards against, etc.

[Ectoparasites of livestock], L. Haseman (*Missouri Sta. Cirs. 257, 261, 264, 267 (1943), pp. [2] each*).—Included are the following practical accounts: Nos. 257, Prevent Ox Warble Losses; 261, Hog Louse and Mange Affect Pork Production; 264, Screwworm Menace to Livestock; and 267, Sheep Scab and Wool Production.

Lumpy jaw, or actinomycosis, J. R. Mohler and M. S. Shahan (*U. S. Dept. Agr. Cir. 438, rev. (1943), pp. 9, illus. 4*).—A revision (E. S. R., 78, p. 107).

Mastitis of dairy cows (*Utah Sta. Bul. 306 [1943], pp. 69, 71*).—Report is made of work aimed at determination of the presence of the bovine mastitis streptococcus or other organisms infectious to the cow's udder and freeing of the udder of these organisms by injections of germicidal substances. In the course of the work 38 quarters of the udders of 15 cows were found to give clinical evidence of mastitis. Fourteen of the quarters were infected with *Streptococcus uberis*, 11 with *S. agalactiae*, 6 with atypical streptococci, and the infection in 7 was not classified. Twenty-five quarters of the udders of 10 cows were injected with colloidal silver oxide suspension in oil (Novoxil), injections having been made just prior to drying up the cows. Of the 14 quarters infected with *S. uberis*, organisms could be demonstrated in only 1 following treatment. Five quarters infected with *S. agalactiae*, 2 with atypical streptococci, and 4 whose infection was not classified, all proved free from organisms following treatment. Four quarters (1 cow) infected with atypical streptococci and 5 quarters (2 cows) whose type of infection was not determined were injected with acriflavine dye solution. One cow with 1 infected quarter was freed from infection, but the remaining 8 quarters (2 cows) continued to harbor infection. Nine quarters of the udders of 5 cows, of which 7 were infected with *S. agalactiae*, were injected with tyrothricin solution. Three of the quarters continued to show infection following treatment, while the remaining 4 proved free from infection. Two quarters with the type of infection not determined proved free from infection following treatment. The results to date suggest that silver oxide treatment is effective in eliminating infection from streptococci-infected udders. Novoxil solution appeared to be more irritating to the udder tissue than the other solutions used. One quarter injected with Novoxil developed such a severe reaction that it appears that its production is permanently impaired as the result of the treatment.

Chronic mastitis, G. J. Hucker *(New York State Sta. Cir. 147, rev. (1943), pp. 6, illus. 3)*.—A revision (E. S. R., 72, p. 105).

Mastitis of dairy cows, D. E. Madsen *(Utah Sta. Cir. 118 (1943), pp. 15, illus. 3)*.—A practical account of mastitis in the dairy cow, means of control, and treatment through injection of various bacteriostatic and bactericidal agents into the udder.

Further tests with unconditioned phenothiazine as an anthelmintic in cattle, D. A. Porter. (U. S. D. A.). *(Helminthol. Soc. Wash. Proc., 8 (1941), No. 2, pp. 38–41)*.—In further work (E. S. R., 83, p. 543) critical tests on four yearlings and two calves and field tests on two yearlings indicated that unconditioned phenothiazine was effective for the removal of *Haemonchus*, *Oesophagostomum*, and *Trichostrongylus* in doses as low as 0.1 gm. per pound of body weight. Apparently the drug was equally effective whether given in feed or by capsule and whether given with or without a preliminary period of fasting.

Control sheep parasites and increase meat, wool, and medical supplies for the war, J. E. Foster *(Res. and Farming [North Carolina Sta.], 1 (1943), Prog. Rpt. 2, p. 9, illus. 1)*.

Parasitic gastritis in sheep: Field trials with phenothiazine and mineral supplements, W. L. Stewart and H. D. Crofton *(Vet. Rec., 55 (1943), No. 1, pp. 3–4)*.—In field trials on two farms in which the lambs in each trial were divided into groups of 20, all were maintained under identical conditions. Four groups were given phenothiazine, mineral solutions, phenothiazine and mineral solution, and no treatment, respectively. From the results, which are statistically analyzed, all the treatments are shown to have been successful, the combined treatments having been most so on one farm. No conclusions are drawn from the experiment on the other farm.

Use of phenothiazine for sheep compared with other anthelmintics—suggested method of administration, W. T. S. Thorp and T. B. Keith. (Pa. Expt. Sta.). *(Vet. Med., 38 (1943), No. 6, pp. 215–220, illus. 8)*.—The authors conclude that phenothiazine is a very satisfactory anthelmintic when compared to the other materials now commonly used. It will maintain a reduction of the parasite egg counts for a longer period than the other anthelmintics with which it was compared. "A 1 to 9 mixture of phenothiazine and salt was an efficient anthelmintic in 31 of 32 ewes and lambs which were kept on small but apparently heavily parasitized pasture lots. If properly handled, this method of administration shows promise of simplifying the use of phenothiazine. Further work is necessary before this system of administration can be recommended as a general procedure. However, the work of others and this report indicate that this procedure has many possibilities. A phenothiazine drench given to heavily parasitized lambs brought about a prompt reduction in parasites as indicated by the fecal counts. This reduction was maintained by the use of the phenothiazine-salt mixture."

Phenothiazine for control of stomach worms in sheep, H. M. Briggs and H. C. Smith (*Oklahoma Sta. Bul. 263 (1943), pp. 8*).—Tests in which phenothiazine was administered by seven common methods for the control of the stomach worm in sheep all proved very effective, the efficiency ranging from 99.7 to 100 percent. All of the lambs except the untreated ones made substantial gains in comparison with those treated with copper sulfate, which removed approximately 98.8 percent of the worms.

On the effect of repeated dosing of sheep with phenothiazine, A. Foggie (*Vet. Rec., 55 (1943), No. 1, pp. 5, 6, illus. 1*).—Report is made of experimental work in which the administration of phenothiazine to a flock of 30 lambs cut short an outbreak of parasitic gastritis, leaving a residual infestation. Repeated dosing of half the flock did not alter their general condition and failed to affect this residual infestation when compared with the untreated half. The hypothesis is put forward that phenothiazine acts by enabling the resistance mechanism of the host to reach a toleration level, and that once this host parasite balance is established it has no further action.

Treatment of coccidial infections of lambs with sulfaguanidine, A. O. Foster, J. F. Christensen, and R. T. Habermann. (U. S. D. A.). (*Helminthol. Soc. Wash. Proc., 8 (1941), No. 2, pp. 33–38*).—The results of experiments here reported, the details being given in tables, are considered to justify the following conclusions: Administrations of sulfaguanidine in 2-gm. amounts per lamb daily, except Sunday, prevented completely the acquirement of natural coccidial infections in five lambs and rapidly reduced to insignificant proportions heavy existing subclinical natural infections in four lambs. Administrations of the drug in 1-gm. daily doses per lamb postponed initial oocyst discharge from natural infections for at least 4 weeks in two lambs and, once oocyst production had started, kept it effectively subdued for as long as the treatments were continued. In the dosages specified, the drug had no apparent harmful influence on the growth and development of the lambs during the course of the experiment.

Further studies with sulfaguanidine in the control of ovine coccidiosis, J. F. Christensen and A. O. Foster. (U. S. D. A.). (*Vet. Med., 38 (1943), No. 4, pp. 144–147*).—Further studies (see above) indicate that coccidiosis of feeder lambs can be prevented by the use of sulfaguanidine. The relatively small doses of the drug administered prophylactically to one group of lambs during the incubation and expected clinical periods of the infection effectively prevented the onset of clinical symptoms of coccidiosis and virtually inhibited the production of oocysts. One lamb of this group showed mild scouring, but on the basis of previous experience with sulfaguanidine in sheep it is doubtful that this symptom was due to the drug. The drug showed no value in the group on which it was tested for curative action, but the decline in oocyst production during treatment with sulfaguanidine and the appearance at this time of a high proportion of abnormal oocysts suggest the possibility of therapeutic value in clinical infections of longer duration than reported.

The fate of sulphanilamide in sheep, F. Alexander (*Vet. Rec., 55 (1943), No. 21, pp. 217–218, illus. 2*).—It is concluded that sulfanilamide in sheep's blood exists mainly in the free form. The drug is cleared exponentially, the time of half clearance being from 5 to 6 hr. Sheep acetylate sulfanilamide more than man, mouse, or dog, but less than rabbit or the one cow dealt with. Sheep excrete sulfanilamide mainly in the urine, and excretion takes place mostly in the first 24 hr. As more free sulfacetamide than sulfanilamide is excreted in sheep's urine, the former drug is probably the better urinary antiseptic in this species.

A comparison of the tetrachlorethylene and the combined copper-sulfate-nicotine-sulfate solution as treatments for the control of worm parasites

of the digestive tract of sheep and lambs, J. P. WILLMAN and D. W. BAKER (*[New York] Cornell Sta. Rpt. 1942, pp. 106–107*).—A flock of 39 ewes and 54 lambs that were grazed on permanent pasture during the summer of 1941 were used in an experiment to compare the effectiveness of treatments for the control of worm parasites of the digestive tract. One group of 27 lambs was drenched eight times between May 9 and September 18 with the combined 1-percent copper sulfate-nicotine sulfate solution. Another similar group was drenched the same number of times, but the combined sulfate treatment and the tetrachloroethylene-mineral oil treatment were alternated during this period. Two groups of ewes were treated in the same manner six times between May 9 and August 19. Fecal samples were taken at four different times from the ewes and from the lambs to measure the effectiveness of the two treatments.

The parasitological examinations made after slaughtering showed little difference in the effectiveness of the treatments used in 1941. The results of earlier experiments, and especially those obtained during the wet season of 1940, indicated a greater effectiveness in the control of stomach and small-intestine worms through the alternate use of the tetrachloroethylene and the combined sulfate treatments. An average of the results of three tests shows that the alternated treatments throughout the summer, with the tetrachloroethylene-mineral oil treatment given as the last drench in September or October, were more effective than were the combined sulfates alone in the control of the small coiled worms known as *Cooperia* and found in the small intestines. In the same trials the combined sulfates were more effective than the alternated treatments in the control of the nodular worm *Oesophagostomum columbianum*. These treatments were equally effective in the control of other stomach and intestinal parasites. The combined sulfate treatment has the advantage of being readily available, inexpensive, and easier to administer. Fecal examinations, using the Stoll technic, proved not to be a good index of the degree of infection encountered in this work. It is noted that these examinations might have been more valuable if heavier infections had been encountered.

Hog cholera, C. ELDER and O. S. CRISLER (*Missouri Sta. Bul. 465 (1943), pp. 8*).—A practical account of hog cholera, its prevention, and care of swine following their vaccination.

Control of worms in swine in Georgia, J. S. ANDREWS and B. L. SOUTHWELL (*Georgia Coastal Plain Sta. Cir. 9 (1942), pp. 13, illus. 2*).—A practical summary of information on the control of worms in swine, the value of treatment, methods for the control of roundworms and the thorn-headed worm, longevity of infective stages of swine parasites in contaminated soil, and the importance of preventing parasite infection in swine.

Adenomatous tumors in the large intestine of cats caused by Strongyloides tumefaciens, n. sp., E. W. PRICE and G. DIKMANS. (U. S. D. A.). (*Helminthol. Soc. Wash. Proc., 8 (1941), No. 2, pp. 41–44, illus. 1*).

A note on the use of sulphaguanidine in rabbits, J. O. JOSHUA (*Vet. Rec., 55 (1943), No. 13, p. 149*).—It is pointed out that earlier experimental work has shown quite clearly that prolonged administration of sulfaguanidine to rabbits is almost invariably fatal. In the work here referred to two methods were considered: (1) One fairly large dose daily on 2 consecutive days and (2) very small doses over a longer period. In the experiments the first was adopted, the drug having been administered to more than 50 rabbits without the loss of any. The dosage used was 0.5 gm. per kilogram of body weight fed once daily in the mash on 2 successive days. Doses as high as 1 gm. per kilogram of body weight are said to have been well tolerated by this method. Administration of the drug is followed by a period of 24–48 hr., during which there is almost complete abeyance of the passage of feces. For this reason, in the early trials dosage was followed by a saline purgative, but this appears to be unnecessary. Estimation of the concentration of sulfaguanidine in the feces has been carried out in a few cases, and it has been shown that a single dose of 0.5 gm. per kilogram of body weight gives a concentration of well over the required 200 mg. percent 36 hr. after dosage. It has been found in several cases that this method of dosing may be repeated at 10-day intervals without ill effect. Up to three periods of dosage have been shown to be safe.

Some recent developments in poultry and turkey research, R. S. Dearstyne (*Res. and Farming* [*North Carolina Sta.*], *1* (*1943*), *Prog. Rpt. 2, p. 11*).

Is "bluecomb" of fowls produced by wheat? G. D. Quigley. (Md. Expt. Sta.) (*Poultry Sci.*, *22* (*1943*), *No. 3, pp. 267–268*).—The feeding trials here reported indicate that wheat is not the direct cause of bluecomb, although the results do not exclude the possibility that under circumstances not at present fully understood it may be a contributing factor.

Avian pneumoencephalitis, J. R. Beach. (Univ. Calif.). (*North Amer. Vet.*, *24* (*1943*), *No. 5, pp. 288–292, illus. 3*).

Vermifuge treatments and egg production, R. M. Smith (*Arkansas Sta. Bul. 431* (*1943*), *pp. 26, illus. 3*).—Report is made of work conducted to determine the influence of treatments of nicotine sulfate and kamala on egg production, egg weight, feed requirement, and mortality of the laying flock. These drugs and combinations of them were used as anthelmintics on both hens and pullets. Treated groups were compared with control groups on the basis of egg production, egg weight, feed requirement, and mortality. Six separate trials were made during the period 1931–39, which involved 1,038 birds.

"Egg production was slightly but consistently higher in groups that received the different nicotine sulfate treatments than in the comparable control groups. This difference was not statistically significant in any comparison. The average difference in mean biweekly egg production for the treated and control groups was 0.64 egg for the hens and 0.47 egg for the pullets. Nicotine sulfate treatments did not interfere with egg production. Egg production during the entire trial period for the groups that received 1-gm. doses of kamala in either tablet or powder form was not significantly different from that of the control groups. The greatest difference in mean biweekly egg production was 0.70 egg, or 11.90 more eggs for the treated group during the 238-day period. Egg production decreased significantly during the 10-day period following kamala treatment. The average difference in mean egg production for the 10-day period before and following the treatment was —1.38 eggs for the treated hens and pullets and 0.34 egg for the control groups. The mean egg production for the entire trial period was not influenced by the kamala-nicotine sulfate combinations. Egg production for the 10-day period following the kamala-nicotine treatment decreased approximately the same amount as with the kamala treatment. No consistent relationship was observed between average weight of eggs for the entire period of trial and the different vermifuge treatments. Kamala in 1-gm. doses, when administered alone or in combination with nicotine sulfate, caused a highly significant decrease in egg weight for the 10-day period following treatment. The range in decrease was from —1.92 to —4.03 gm. per egg for the 10-day period. Feed requirement per dozen eggs produced and pounds of feed consumed per bird were practically the same for both treated and control groups. The percentage of mortality was apparently not associated with the vermifuge treatments. It was generally concluded, on the basis of the data obtained, that the administration of vermifuge treatments to apparently healthy hens or pullets was of questionable value from the standpoints of increased egg production, reduced feed requirement, or improved health of the flock."

Leucocytozoon smithi infection and other diseases of turkey poults in central Texas, W. C. Banks. (Tex. A. and M. Col.). (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 795, pp. 467–468*).—This contribution records the common infection of turkey poults in the central part of Texas by *L. smithi*, where it appears to be the only cause of loss in certain flocks. The author failed to find intracorpuscular bodies, as described for this organism, in blood smears. It is thought possible that the bodies seen in erythrocytes of affected birds by certain investigators are *Haemoproteus* and bear no relation to the life cycle of *L. smithi*.

Leucocytozoon sp. from turkeys in California, W. R. Hinshaw and E. McNeil. (Univ. Calif.). (*Poultry Sci., 22 (1943), No. 3, pp. 268–269*).—In blood smears taken from turkeys on four ranches in Tehama County, Calif., all showed heavy infections of *Leucocytozoon* sp. This is thought to be the first report of this blood parasite in turkeys in the western United States.

Turkey malaria, H. S. Purchase (*Parasitology, 34 (1942), No. 3–4, pp. 278–283*).—Description is given of a malarial disease of turkeys in Kenya. The parasite is harmless to ducks, adult fowls, and chicks, although in the chick a symptomless, transient, and apparently self-limited infection can be established.

Heat exhaustion in young turkeys, G. W. Stiles. (U. S. D. A.). (*Poultry Sci,. 22 (1943), No. 3, pp. 242–247, illus. 1*).—Report is made of a study of a flock near Denver, Colo., in which at the age of 3 weeks 6,000 June-hatched turkeys were abruptly transferred from sheltered, relatively cool battery brooders into quarters where the heat inside the building and on the porches was unbearably hot. This was done during the hottest days of the year, and the birds were not acclimatized by gradual exposure to the changed conditions. Excessively high temperatures and low humidity on the dark-colored sun porches and in the improperly ventilated brooder caused heat exhaustion, resulting in low body temperatures, sweating, prostration, and death. When heat was applied many affected poults recovered. With the correction of the ventilating system in the brooder, addition of shelter to portions of the porches, and the advent of cooler weather, the trouble ceased. There was no evidence of bacterial or parasitic disease in the flock. Sanitary measures and other phases of management were excellent.

AGRICULTURAL ENGINEERING

Irrigation by sprinkling, J. E. Christiansen (*California Sta. Bul. 670 (1942), pp. 124+, illus. 56*).—This bulletin discusses the application of irrigation water by sprinkling, presenting the results of several years' research together with general information. Although intended especially for farmers who are now operating sprinkler systems of contemplating irrigation by this method, the bulletin includes a section containing some technical material essential to an economical design of sprinkler systems—material of interest primarily to engineers, irrigation contractors, and others engaged in manufacturing, selling, and installing sprinkler equipment. A closing section presents in nontechical form a discussion of design and operation of sprinkler systems.

Surface water supply of the United States, 1941, parts 1, 5, 6 (*U. S. Geol. Survey, Water-Supply Papers 921 (1943), pp. 577+, illus. 1; 925 (1943), pp. 404+, illus. 1; 926 (1943), pp. 478+, illus. 1*).—These papers record measurements of stream flow for the year ended September 30, 1941, No. 921 covering the North Atlantic slope basins, No. 925 the Hudson Bay and upper Mississippi River basins, and No. 926 the Missouri River Basin.

Unified terracing procedure, J. T. Copeland. (Miss. State Col.). (*Agr. Engin., 24 (1943), No. 5, pp. 146, 148*).—The author describes more or less disastrous results of confusion and nonuniformity in terrace planning in Mississippi, and reports upon measures taken to secure standardized conservation practices.

Effect on infiltration of surface mulches of soybean residues, corn, stover, and wheat straw, E. H. Kidder, R. S. Stauffer, and C. A. Van Doren. (Ill. Expt. Sta. and U. S. D. A.). (*Agr. Engin., 24 (1943), No. 5, pp. 155–159, illus. 7*).—Artificial rainfall was applied in quadruplicate plats 12 by 6 ft. in size at an intensity of 1.75 in. per hour until the rate of infiltration remained reasonably constant for a minimum of 30 min.

The rate of infiltration at the beginning of a run was often in excess of one in. per hour. This rate decreased rapidly during the first 15 min. of the run on the unmulched plats. Application of artificial rain to unmulched soil causes the pores at the surface to seal, resulting in a high percentage of water loss and considerable erosion. Straw mulches and corn and soybean residues, by protecting the surface soil and creating ponds, greatly reduce the amount of surface area that is sealed by the dispersive action of the raindrops. A deeper boundary film of water on the mulched as contrasted to the unmulched plats caused the high-velocity currents to move at a greater distance from the ground surface.

"With the wartime demand for increased acreages of grain crops, the necessity of keeping the residues on the land cannot be overemphasized." The practice of disposing commercially of crop residues such as corn stover and grain straw "is increasing the erosion hazard on sloping fields by allowing increased runoff and resulting increases in soil loss."

Farming for greater production of war crops in the intermountain and southwestern country (*U. S. Dept. Agr., Misc. Pub. 517 (1943), pp. [12], illus. 10*).—Soil conservation measures which can be put into immediate use without technical assistance, suggestions for similarly simple improvements in irrigation practice, and conservation practices for dry farming and range areas are briefly set forth. Avoidance of the soil "mining" and the range devastation produced by overgrazing, which characterized the increased production required by the preceding war, is emphasized. It is thought that production requirements can be met without practices disastrous to the future productiveness of the land.

Reducing labor and power in cotton production, H. P. Smith. (Tex. Expt. Sta.). (*Agr. Engin., 24 (1943), No. 5, pp. 149–150, illus. 3*).—The principal means whereby the power and labor requirements of this crop may be lowered are held to be (1) the use of larger units and the performance of two or more operations at the same time; (2) mechanical thinning, hill dropping of mechanically delinted seed, and planting thin; (3) the treating of planting seed to obtain better stands, thus reducing replanting operations; (4) shallow cultivation; and (5) the use of mechanical harvesting equipment. It is further pointed out that a suitable mechanical harvester in the plains areas would reduce almost by one-half the total labor to produce a crop. In these areas a simple, cheap, stripper-type machine can be used satisfactorily. In sections where the plants grow larger and the harvest is earlier, a picker-type machine would probably be more suitable.

Producing flax with less labor and power, A. J. Schwantes. (Minn. Expt. Sta.). (*Agr. Engin., 24 (1943), No. 5, pp. 161–163*).—Clean seed is of utmost importance. The ordinary farm fanning mill is capable of doing a fair job if it is equipped with sieves of correct size, but it may be necessary to run the seed through the mill two or three times. A combination of a fanning mill and a disk cleaner has been found highly efficient in producing clean seed and in the use of labor, and such an outfit or other commercial cleaner should be available for community use, either through cooperative ownership or at a local seed store or elevator. Increasing field sizes will improve field operating efficiencies, especially as the size of the field machines increases. The size of the power and machine unit and speed of operations are important factors in labor efficiency. For most field operations savings in time will result from the use of tractors instead of horses. Flax produces highest yields if planted as soon as the land can be worked. Plowing may do more harm than good by bringing to the surface old weed seeds that had not germinated. Disking of grain stubble immediately after harvest in preparation for flax the following year is usually well worth while; disking immediately before plowing generally is not. It is advisable to separate succeeding tillage operations to allow weed seeds to germinate. It is not necessary to burn cornstalks if corn-stubble land is prepared for flax by disking. Double disking and harrowing only once with a flexible harrow immediately before planting is considered a satisfactory method of preparing a seedbed for flax on comparatively clean ground in western Minnesota. The use of the combine method of harvesting flax requires the least labor. Windrowing is necessary in the presence of weeds or in adverse weather during harvest. Flax planted the same time as spring wheat will mature about 10 days later. It will not shatter or lodge badly for a short time after it is ripe. Combines used for cereals should be available for flax, and a single combine can be made to harvest a considerable acreage.

Reducing labor and power in soybean production, R. I. Shawl and A. L. Young. (Univ. Ill.). (*Agr. Engin., 24 (1943), No. 5, pp. 146, 148*).—The two principal causes of increased labor requirements are (1) if the ground stays wet for a very long period after planting, the germination of the beans may be greatly reduced, necessitating replanting; and (2) if a hard surface crust forms on the ground before the seed germinates, the tender necks of the bean stems may be broken as they push through the surface, greatly reducing the stand. This crust must be broken by rotary hoeing or harrowing before the beans start to push through the ground. A system of soybean production in which some of the practices are standard, while others offer considerable possibilities in labor and power saving, is briefly outlined under the headings—soil preparation, planting, cultivating, harvesting, and general suggestions.

Producing hay with less labor and power, L. A. Brandrup (*Agr. Engin., 24 (1943), No. 5, p. 160, illus. 1*).—The author's basic suggestions for this purpose are (1) keep existing equipment in good repair, (2) interest local agencies in assisting with the training of people who must operate and repair equipment, (3) raise maximum yields of hay, (4) plan for the extended use and duty of existing machines in areas of machine shortage, and (5) meet the lack of adequate up-to-date machinery by the use of home-made equipment. Available means for carrying out some of these suggestions are briefly discussed.

[Local adaptations of imported agricultural machinery] (*Hawaii Sta. Bien. Rpt. 1941–42, pp. 69–71, illus. 1*).—Adaptations and limitations of a considerable number of types of agricultural machines brought into the Territory soon after the beginning of the current war are stated for all machines thus far experimentally studied.

A device for plowing under fertilizer, R. H. Wileman. (Ind. Expt. Sta.) (*Agr. Engin., 24 (1943), No. 5, pp. 147–148, illus. 2*).—The fertilizer hopper and feed mechanism from a commercial tractor cultivator side-dressing attachment was supported on a suitable frame on a two-bottom, 14-in. tractor plow. The feed mechanism drive shaft was extended to the landside of the plow and an auxiliary wheel attached to an arm which pivots around this shaft. The drive wheel runs on the unplowed land and is free to conform to the ground contour, irrespective of the plow. The lower limit to which this wheel can go is controlled by a chain which raises the wheel clear of the ground when the plow is lifted, thus stopping the fertilizer mechanism. When it is desired to use the plow and not the fertilizer attachment, the drive wheel can be raised and fastened, so that it does not come in contact with the ground when the plow is operating. The distributor drive consists of a disk gear on the drive wheel which operates a pinion on the upright shaft. This pinion is adjustable by a speed change mechanism, enabling a quick change to any ratio on the disk gear. The upright shaft is connected to the distributor shaft by bevel gears which take care of the up-and-down movement of the drive wheel. This type of drive makes possible a wide selection of distributor shaft speeds and, thus, a wide range of rates of application. This was very desirable in experimental tests. The feed gate adjustments, together with the drive speed changes, enable applications of from 100 to over 2,500 lb. of fertilizer per acre. Flexible distributing tubes were provided and arranged so that, by shifting these tubes and changing the type of spreader or boot, the fertilizer could be broadcast on the surface before the furrow slice was turned, spread in the trash immediately back of the jointer, or placed in a band on the bottom of each furrow. Provision was also made for shifting one of the flexible distributing tubes so that the fertilizer was all placed in one furrow.

Best results were obtained where the fertilizer was placed in bands on the plow sole. For corn, no significant difference between 14- and 28-in. band spacing was found. The concentration of the fertilizer in a band on the plow sole proved better than mixing it in the trash as the furrow slice is turned, and much better than broadcasting it on the surface before plowing.

Converting a horse-drawn mower into a power mower, L. F. LARSEN (*South Dakota Sta. Cir. 44 (1943), pp. 8, illus. 11*).—Unnecessary gears, drive wheels, axle, and seat are removed from the mower, which is then so blocked up under the tractor that the mower is in its usual working position, the end of the original mower tongue being 32 in. above the ground, the axle housing at a height the same as that at which it would be supported if the wheels were still in place. When locating the position of mower under the tractor it is advisable to have the cutter bar placed near the rear wheel to facilitate ease of turning square corners. In all cases the rear axle housing should be kept parallel to the rear tractor axle. It has been found convenient to provide a stub tongue mounted on the side and parallel to the tractor frame as one point of support. Two other supports are necessary, one on each end of the axle housing, or thereabouts. As the average standard power take-off speed of tractors is approximately 550 r. p. m. it is necessary to have the pulley on the power take-off about 50 percent greater in diameter than the driven pulley in order to run the mower at a proper speed. All other necessary detail of the adaptation is described. It is noted that many horse mowers have only a 5-ft. cutter bar, which is rather short for tractor use. Therefore, a 2-ft. extension was welded onto the original cutter bar and tested, with satisfactory results.

Because of the preference of many farmers for the trailer type of mower, such an adaptation of an old horse-drawn mower was made. Although this mower operated satisfactorily, it was much more complex and expensive to build. Its main advantage was ease of attaching, but all operators preferred the simpler type of mower as it was much more convenient to operate in the field.

Homemade auto buck rake, O. W. MONSON ET AL. (*Montana Sta. Cir. 172 (1943), pp. 11, illus. 8*).—The buck rake described was made entirely from second-hand materials, consisting of angle iron, rods, and bars salvaged from old farm machinery and automobiles. This can be done by the use of acetylene and electric arc welding equipment in addition to the forge, electric drill, and ordinary hand tools usually found in the well-equipped farm shop and local repair shop. A bill of materials is included.

Drying hay with forced ventilation, R. C. Miller and G. R. Shier. (Ohio Expt. Sta.). (*Agr. Engin., 24 (1943), No. 5, pp. 143–145, illus. 3*).—In 1940 and 1941 some observations were made on a farm near London, Ohio, where all the alfalfa hay was dried by this method in a hay barn built specially for the purpose. It is 28 ft. wide by 84 ft. long, and has side walls 14 ft. high and a gambrel roof. A total depth of about 20 ft. of hay (about 85 tons) could easily be stored and dried. In 1940 the first cutting of alfalfa was delayed from about June 5 to 20; and even then all the hay was exposed to several heavy rains over a period of more than 3 days before it could be stored, most of it at moisture contents that ranged from 25 to 55 percent. Although the original plan was not to fill the mow more than 8 ft. deep, the owner found it impossible to cure the balance of the crop in the field, and filled the mow to capacity before the first layer had cured. The results showed some dusty hay, yet most of it was of good quality.

In 1941 a forced natural-air ventilation system was installed in the hay mow of the dairy barn on the Ohio State University farm at Columbus. The tunnel was placed at the side of the mow instead of at the center, and was large proportionately to the air it delivered, in order to lower the velocity to about 1,000 ft. per minute and the static pressure to ⅜ in. (4 ft. wide at the floor, 2 ft. wide at the top, and 8 ft. high). This reduction in velocity and resistance provided fairly uniform air flow through the lateral flue openings, which were placed at 5-ft. intervals along the main tunnel. The large flue at the side permits a person to walk in it to make adjustments in air deliveries to the various flues. The lateral flues opened into the main tunnel at the floor level and were made in sections about 10 ft. long. The section nearest the main tunnel was about 8 in. high and 16 in. wide. The next section was reduced to about 12 in. wide and 7 in. high, and the third section was made of 1- by 6-in. boards for sides and top. The bottom of each flue was open and raised on cleats 1 in. thick, every few feet. A 48-in., six-bladed fan, driven by a 5-hp. motor, delivered about 30,000 cu. ft per minute against a pressure of about ⅜ in. of water. Hay better in color quality and leaf content was made by the barn curing method; and, in weather unfit for field curing, much hay that would otherwise have been lost was saved. The power consumption in the second of the experiments above described was at the rate of 1,833 kw.-hr. for 80 tons of hay, or about 23 kw-hr. per ton of the damp hay, the fan having been operated 499.5 hr. in 30 days. Extra good quality hay, with practically no loss of leaves or color, can be obtained by this method if cutting and curing time is planned carefully.

Trends in hay curing and storage, G. R. Shier (*Agr. Engin., 24 (1943), No. 5, pp 150, 159*).—This committee report notes as a generally recognized fact that dehydration of alfalfa saves more of the total nutrients than any method yet devised, including the making of alfalfa silage, but admits that at present artificial dehydration does not seem adapted to the scale of ordinary farm operations. Information available indicated that of all of the newer developments in hay curing and storage, the mow curing of hay with forced ventilation was receiving the most attention.

Sweet potato vines harvested for livestock feed, A. T. Hendrix (*Res. and Farming [North Carolina Sta.], 1 (1943), Prog. Rpt. 2, p. 8, illus. 2*).—The machine made for this purpose consisted essentially of a number of freely floating rake bars so attached that the bars automatically conform to the ground contour or follow the ground surface, whatever it may be, within the range of operation. Each rake bar is equipped with a skid to prevent its penetration into the ground and also a pick-up finger, which serves to lift the potato vines from the ground surface. The center rake bars, which ride the top of the ridge, have specially arranged knives to cut the vines loose at the ground. On each outer side of the machine a skid is mounted with knives arranged to separate the vines being harvested from the unharvested portion. In the present model of the machine it is necessary to dump the machine at frequent intervals by hand.

Salvaging bale ties, J. C. Wooley (*Missouri Sta. Cir. 255 (1943), pp. [2], illus. 1*).—A vise is mounted at one end of a baseboard of a length such that a vertical lever may be attached by a hinge near the other end and at a distance of 9 ft. 2 in. from the vise. Spikes (16-penny size) are driven through the vertical lever at distances of 6, 12, and 18 in. above the hinge. Each spike is bent to form a hook. The loop in one end of the tie is placed over the hook, and the other end is clamped in the vise. The three hooks take care of different lengths.

Overturning resistance of wood fence posts, H. Giese. (Iowa Expt. Sta. et al.). (*Agr. Engin., 24 (1943), No. 5, pp. 151–154, illus. 8*).—To avoid alteration in the density of the soil, a primary factor in post stability, the posts used in the series of tests here reported upon were set in auger holes bored to a diameter the same as that of the post. As a further precaution against effects of extraneous factors (climatic changes, etc.) influencing the soil and thereby necessitating making readings quickly, and to make possible the measuring of any bending which might take place in the post itself, a post-movement recorder was so constructed as to trace post movements of 10 in. or less at the ground level and at points 1, 2, 3, and 4 ft. above the ground surface. These movements were shown as traces produced by pencil bars spaced 1 in. apart, restricted to horizontal motion and connected by trackers of piano wire to follow rods held against nails driven into the posts. A dynamometer designed for loads up to 1,000 lb. was also provided for measurement of the applied pulls. Yellow pine posts turned to uniform diameters of 2.5, 3, 3.5, and 4 in., respectively, were used. The test plat consisted of a clay loam layer of soil to a depth of about 29 in. Below this a thin layer of yellow clay was found, and at a depth of 34 to 46 in. a gravelly, sandy clay. The points of rotation of a post below the surface of the ground move downward to a maximum value, and then move upward. This maximum value is approximately one-half the depth of set. In the type of soil used for the field tests the strength of a 2.5-in. post is developed at a set between 24 and 28 in. The strength of the 3-in. post is developed at a set between 28 and 32 in. In general, for soil as used in this test, and under moisture conditions experienced, a balance between post strength and soil resistance is reached when the depth of set is approximately 10 times the diameter of the post. When judged by the structural performance of steel posts, wood posts have been larger than necessary when new. This extra allowance for decay need not be provided if posts are properly treated. The setting of small-diameter posts, turned or otherwise formed to uniform size, can be greatly facilitated by the use of augers or by driving.

New hard surfaced floors for the farm poultry house, R. L. Patty and L. F. Larsen (*South Dakota Sta. Cir. 42 (1943), pp. 26, illus. 16*).—This circular gives practical directions for laying (1) a cement-soil flooring formed from a mixture of subsoil and sand made to contain 75 percent sand and 25 percent silt and clay, to which mixture 10 percent of cement is added; and (2) an oil-surfaced floor made with a rapid- or medium-curing road oil, in place of the cement, to stabilize the soil. Both floors are made of a base course of the same soil-sand mixture thoroughly tamped with rammers, and the surface course is similarly tamped. Photographs show satisfactory service of an oil-surfaced floor for 2.5 yr. under poultry, and of an oil-cement floor for 1 yr. under feeder steers. Suitable sand content was found important, and suitable moisture content, for which qualitative tests are given, especially important.

Summer egg cooler for temporary storage on farm, C. A. Roberts and H. D. Polk (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 5*, *pp. 4–5*, *illus. 1*).—The cooler described is of the type depending upon evaporation from burlap curtains kept moist from a running water supply or from a keg reservoir mounted on top of the cooler. In comparison the cooler was found less desirable than a cool, dry cellar or refrigerated storage, but much better than uncooled storage.

Performance of small domestic dehydrators, L. W. Gray (*Agr. Engin.*, *24* (*1943*), *No. 5*, *p. 164*).—The possibilities and limitations of small community and individual dehydration units now being made available are briefly discussed, with some special reference to the local (Georgia) conditions.

AGRICULTURAL ECONOMICS

Farm wage rates, farm employment, and related data (*U. S. Dept. Agr.*, *Bur. Agr. Econ.*, *1943*, *pp. 193+*, *illus. 6*).—This report brings together the most significant data on farm wage rates and employment that have been collected and published by the Department in the past. The first three sections (pp. 1–173), farm wage rates and index numbers, piece-work rates, and farm employment (family workers and hired workers), include detailed data in tabular form. The fourth section (pp. 174–193) "is devoted to broad comparisons of agricultural income, the farm wage bill, industrial wage rates, and related information."

More manpower for the production program, C. F. Reuss (*Washington Sta. V Cir. 1* (*1942*), *pp. 4*).—The author maintains that as an emergency measure to avert the threatened food shortage, "the part-time farmers and the suburban gardeners offer a reservoir of potential food producers and a store of available resources that must be tapped." "By himself, each victory gardener and part-time farmer can do little to help the food production program; in the aggregate, working together on a unified program, these small-scale operators conceivably could spell the difference between the success and the failure of the food production program."

Estudio de 96 granjas de la P. R. R. A. establecidas en Cayey, Cidra, y Aibonito [A study of 96 farms of the Puerto Rico Reconstruction Administration in Cayey, Cidra, and Aibonito], D. Haddock (*Puerto Rico Univ. Sta. Bul. 63* (*1942*), *Span ed.*, *pp. 28*; *Eng. abs.*, *pp. 27–28*).—This study is based on the agricultural operations and other activities from April 30, 1938, to May 1, 1939, of 96 small farms representative of the new farms in the region.

The average size of the 96 parcels was 6.3 cuerdas, of which two-thirds were in crops. The capital invested was $1,057 per parcel. The farmer's investment was $30, of which $29 was in livestock. Farm cash expenses averaged $80 per parcel, of which rent to the Reconstruction Administration constituted 40 percent. The receipts, including labor off the farm, exceeded expenses by $120 per farm. Eliminating the receipts from such labor, the farm income was —$4 per farm.

Tractor costs in western Washington and food production in 1943, A. W. Peterson, M. T. Buchanan, C. F. Reuss, B. H. Pubols, and O. J. Trenary. (Coop. U. S. D. A. et al.). (*Washington Sta. V Cir. 11* (*1943*), *pp. 4*).—Preliminary information on the effects of size, age, and hours of use on the cost of operating tractors in 1942-43 is discussed. The data are based on 90 reports obtained from dairy farms with an average of 80 acres in crops.

Tractor costs in eastern Washington and future food production, A. W. Peterson and M. T. Buchanan .(*Washington Sta. V Cir. 12 (1943), pp. 8*).—This circular gives information similar to that noted above and is based on 95 records for diesel and 20 records for gasoline track-type tractors.

Feed—per acre and per hour, P. Nelson and E. A. Tucker (*Oklahoma Sta. Bul. 268 (1943), pp. 8, illus. 1*).—Tables are included and discussed showing the net yield of wheat eequivalent feed units per acre and per hour of man labor for the principal crops grown for Garfield County for the period 1930–40 and for crop-reporting districts II, VI, VII, and VIII of the State for the period 1923–32.

Costos e ingresos de algodon sea-island en la costa noroeste de Puerto Rico, 1939 y 1940 [Costs and returns from sea-island cotton on the northwestern coast of Puerto Rico, 1939 and 1940], L. M. Géigel (*Puerto Rico Univ. Sta. Bul. 61 (1942), Span. ed., pp. 41, illus. 3; Eng. abs., pp. 40–41*).—Information from 140 (476 cuerdas) sea-island cotton plantings in 1939 and 210 plantings (617 cuerdas) in 1940 was obtained. Analysis is made of the costs of production and the variations in and the factors affecting such costs and returns.

Sharecroppers planted 62 percent of the crop in 1939 and 71 percent in 1940. The average yields of seed cotton per cuerda (0.97 acre) and the average price of the seed per pound were 498 lb. and 8.7 ct. in 1939 and 674 lb. and 9.1 ct. in 1940. The average costs of production per cuerda and per quintal were $29.67 and $5.96 in 1939 and $37.21 and $5.53 in 1940. The net returns were $13.68 and $2.74 in 1939 and $24 29 and $3.59 in 1940. Growing costs per cuerda were about the same on soils of high, low, or medium productivity. Tenure had no material effect on net returns. The farmers making the highest returns had yields above 700 lb. of seed cotton per cuerda, applied more than 400 lb. of fertilizer per cuerda, harvested over 95 percent of first-class cotton, cultivated relatively small- to medium-sized plantings, and used from 120 to 160 hr. of labor in growing operations on the soils of high productivity and 120 hr. on the medium and poor soils.

Peanut production costs and income in Oklahoma in 1942, D. L. W. Anker and M. S. Slusher. (Coop. U. S. D. A.). (*Oklahoma Sta. Bul. 267 (1943), pp. 23, illus. 1*).—Information was obtained in interviews with 60 farmers in three counties representative of the peanut-growing areas of eastern and central Oklahoma and 30 farmers in three counties representative of the southwestern part of the State. Analysis is made for the two areas of the comparative income in 1942 from peanuts and cotton and the costs and labor requirements for peanuts. The variations in peanut production methods and the rental agreements for growing peanuts are discussed.

Based on an average yield of 20 bu. per acre for peanuts and 150 lb. of lint for cotton and with prices of $1.26 per bushel for peanuts and 17 ct. per pound for cotton in the eastern and central areas, the average preharvest and harvest costs per acre for peanuts were $11 80 and $18.37 on farms using horsepower and stacking around poles and $11.04 and $8.71 for cotton. The returns per acre to land, machinery, and management were —47 ct. for peanuts and $11.42 for cotton. With a price of $1.95 for peanuts (the probable price in 1943), the returns for peanuts would have been $12.43. The average total labor requirements were 60.7 man- and 42.1 horse-hr. for peanuts shaken and stacked and 46.7 and 42.1 hr. where the peanuts were shaken and windrowed. For cotton 50 and 35.7 hr., respectively, were required. In the southwest area, with average yields and prices of 25 bu. and $1.26 for peanuts, 250 lb. and 16 ct. for cotton, and 1,000 lb. and 94 ct. per 100 lb. for grain sorghum, the total returns to land, machinery, and management were $8.68 for peanuts, $23.09 for cotton, and $1.77 for grain sorghum headed and $2.52 for grain sorghum harvested with combines.

Sweetpotato production: Time-of-planting and hill-spacing studies, W. S. Anderson and J. W. Randolph. (Coop. U. S. D. A.). (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 4, pp. 1, 3–6, illus. 3*).—This article reports the results of experiments in 1940, 1941, and 1942 on different soils with different fertilizer treatments, different spacing, and different planting dates. It also includes reports on studies of production costs and profits under mule and machine methods of production and labor use and income in sweetpotato production.

Survey shows cost of producing milk, R. E. L. Greene (*Res. and Farming* [*North Carolina Sta.*], *1* (*1943*), *Prog. Rpt. 2, pp. 3, 4, illus. 1*).—Data on costs of production and returns for milk in 1941 on 89 farms in two areas producing Grade A milk for sale to wholesale plants are analyzed and discussed.

The average gross costs; credits for manure, calves, milk used, etc.; the amount received for milk sold; and the profit per cow were $202, $28, $183, and $9, respectively, and per 100 lb. of milk sold $3.43, 48 ct., $3.12, and 17 ct., respectively. The labor income was —$172 on farms selling less than 5,000 lb. of milk per cow, $499 for 5,000–6,199 lb., and $1,524 where 6,200 lb. or more were sold per cow.

The demand for fats and oils in the soap industry, A. Kozlik and P. Diebold (*Iowa Sta. Res. Bul. 311* (*1943*), *pp. 417–488, illus. 13*).—The characteristics and blends of fats used in soap manufacture, the use and raw materials in important types of soap, the nonfatty materials used, and the alternative industrial uses of soap fats are briefly described. Analysis is made of the factors affecting the prices of soap fats, the trends and fluctuation in production of different types of soap, and the general trends 1912–40 in fat prices, percentage of the fats used in the soap industry, the use of industrial fats, and fat consumption. The imports of soap fats, the economic policy of manufacturers, and glycerin as a byproduct of the soap industry are described.

Foreign Agriculture, [April, May, and June, 1943] (*U. S. Dept. Agr., Off. Foreign Agr. Relat., Foreign Agr.*, *7* (*1943*), *Nos. 4, pp. 75–96+; 5 pp. 99–120,* illus. *6; 6, pp. 123–144, illus. 1*).—Two articles are included in No. 4: The "New Agrarian Order" in Nazi-Invaded Russia, by L. Volin (pp. 75–84), discussing the Soviet collective system and the Nazi new agrarian order; and Continental Europe's Wartime Food Balance, by J. H. Richter (pp. 85–96), discussing prewar food self-sufficiency, wartime production, wartime energy consumption, consumption by food groups, composition of diet, and post-war requirements. The second study (E. S. R., 88, p. 124) showed that "as a result of changes in the consumption of individual products on the Continent, foodstuffs of animal origin supplied only 17 percent of the total calories compared to 22 percent before the war. The average supply of total protein in 1941–42 was about 8 percent below pre-war; in animal protein alone the decline was probably as much as one-third. These declines and changes show the extent of Europe's wartime food problem and the magnitude of the effort that will be required to overcome it after the war."

No. 5 contains two articles: Angola (Portuguese West Africa), by S. S. Goodstein (pp. 99–115), describing the physical features, people, land utilization, government organization and policy, industries, transportation, agricultural products, and foreign trade; and an article, Norway's Pre-war Fish Balance, by K. J. Friedmann (pp. 116–120), presenting statistics as to the production and trade in fish and fish products, 1933 through 1938.

In No. 6 are the following articles: Agricultural Reconstruction in China, by O. L. Dawson (pp. 123–134), describing the basic problems of Chinese agriculture, the policies of the Ministry of Agriculture and Forestry, recent views of post-war reconstruction, and the measures in which the United States may lend aid; Agriculture in the Iranian (Persian) Trade Agreement, by C. E. Whipple (pp. 135–137), describing the concessions made by the United States and Iran; French Food Rationing, by L. Bacon (pp. 138–142), including a table showing the average weekly rations, August 1940 to November 1942, of "basic" foods; and United Kingdom Rationing System for Livestock Feedstuffs (pp. 143–144).

The dairy industry of Colombia, R. E. Hodgson and O. F. Hunziker (*U. S. Dept. Agr., Bur. Dairy Indus., 1942, pp. 41+*).—This report is based on a study made in behalf of the Office of Coordination of Inter-American Affairs. The principal dairy regions, dairy production—cattle population, breeds and breeding, feeds and feeding, diseases and parasites—and farm management are described. The production, assembling, pasteurization, distribution, prices, etc., of market milk; the production of cheese, butter, and other dairy products; the need for national organization of dairymen and distributors; and education as to the value of dairy products in the human diet are discussed. Programs for expediting total milk production and for Government-sponsored agricultural research, education, and extension are outlined.

The dairy industry of El Salvador, R. E. Hodgson and O. F. Hunziker (*U. S. Dept. Agr., Bur. Dairy Indus., 1943, pp. 32+*).—This is a study similar to that noted above for Colombia.

Railroad facilities for handling livestock at shipping points in the Corn Belt region, K. Bjorka (*U. S. Dept. Agr., Bur. Agr. Econ., 1943, pp. 39+, illus. 15*).—This study is a segment of a broader study of livestock transportation by the Corn Belt Livestock Marketing Research Committee. Tables are included and discussed showing for the region and by States the availability of stockyards, number of pens and capacity of the yards, and the loading, weighing, and water facilities. It is based on the information available for 9,988 towns on railroads in the 12 North Central States, Kentucky, and Oklahoma.

Of the towns, 72 percent were provided with stockyards. Nearly 75 percent of the yards had 1 to 4 pens, and only 4 percent more than 10 pens. The capacity of 41.7 percent of the yards was 4 carloads or less. Only 41 percent of the yards were equipped to load double-deck cars. Scales were available at 52 percent of the yards and water facilities at 73 percent.

Milk assembling and distribution in Harrison County, West Virginia, M. A. Abrahamsen (*West Virginia Sta. Mimeog. Cir. 47 (1943), pp. 30+, illus. 3*).—Data were obtained from 2 dairy plants distributing milk in Clarksburg, the condensery operating in the area, 16 operators of milk trucks hauling milk sold wholesale, 14 farmers hauling their own milk, 34 producer-distributors and 2 distributing plants operating in Clarksburg and other towns and communities, and 159 families in the area of Clarksburg. The nature and extent of milk assembling and distributing and possible reorganizations of the assembling and distributing services are discussed.

Trucks, major item in milk distribution, W. C. Mebus (*Miss. Farm Res. [Mississippi Sta.], 6 (1943), No. 4, pp. 1, 7*).—This progress report presents findings as to the age and condition of trucks and tires, the length and efficiency of operation of milk routes, etc., of 139 milk trucks hauling to 11 milk plants in the northeastern part of Mississippi.

Distribucion de legumbres y hortalizas en las ciudades de Rio Piedras y San Juan [The marketing of vegetables in the cities of Rio Piedras and San Juan], S. Díaz-Pacheco and J. R. Noguera (*Puerto Rico Univ. Sta. Bul. 62 (1942), Span. ed., pp. 40; Eng. abs., pp. 36–40*).—The objectives of the first study, entitled The Organization of the Marketing System and the Costs of Distribution, were "to obtain information on the organization of the agencies selling fruits and vegetables, to find out the price spread between the farmer and the consumer, and to determine expenses incurred by the different agencies in the marketing of vegetables and profits resulting to each therefrom." It is based on data gathered from farmers, country buyers, wholesale dealers, and retailers doing business in the metropolitan area of San Juan. The second study, entitled Costs of Operating Trucks in the Distribution of Vegetables, is based on information obtained from 53 motortruck operators hauling vegetables to the Rio Piedras market from July 1939 to June 1940.

The total assets of country buyers operating trucks averaged $1,180 and for those not using trucks $139, wholesale dealers $560, retail peddlers $27, and vegetable stores $163. During the period May 5 to 16, 1941, the farmers received an average of 44 ct. out of each dollar spent by consumers for vegetables, country buyers and wholesalers 29 ct., and retailers 27 ct. From May 20 to June 21, 1940, vegetable stands in the market place received 28 ct., grocery stores 36 ct., street peddlers 32 ct., and "ventorrillos" (small stores) 33 ct. Middlemen received $56 per $100 of sales. Their total expenses averaged $44.

The average cost of operating motortrucks was $2,184. Labor, fuel, oil, depreciation, and tires constituted 82 percent of the total costs. The average cost per ton-mile was 6.92 ct. On the basis of mileage alone, the cost per ton-mile decreased from 10.21 ct. for trucks carrying 4 tons or less and traveling less than 15,000 miles to 8.64 ct. for those traveling over 15,000 miles. For trucks carrying over 4 tons the decrease was from 6.68 to 5.4 ct. On the basis of weight alone, the decrease was from 10.21 ct. to 6.68 ct.

Wartime adjustments of fruit and vegetable cooperatives, M. C. GAY (*U. S. Dept. Agr., Farm Credit Admin., 1943, W. C. 5, pp. 10+*).—This is a general summary of the wartime problems of fruit and vegetable cooperatives and the means used in adapting their business and operating programs for maximum wartime service.

Marketing Missouri farm timber crops, R. H. PECK, W. C. SECHRIST, and C. W. LEACH (*Missouri Sta. Bul. 460 (1943), pp. 43, illus. 23*).—This is a guide for the average woodland owner in disposing of mature timber. The proper methods of measuring, harvesting, transporting, caring for, and selling timber products are discussed. The marketable wood products are listed by counties. Tables are included showing the weight of the common classes of woods and logs, board feet in different-sized logs, etc., and samples of an invitation to bid and a contract form for timber sales.

RURAL SOCIOLOGY

Levels of living and population movements in rural areas of Ohio, 1930–1940, A. R. MANGUS and R. L. MCNAMARA. (*Ohio Sta. Bul. 639 (1943), pp. 62+, illus. 8*).—It is the purpose of this bulletin to analyze the recent growth and change in the rural population of Ohio in relation to level-of-living areas within the State. Most of the data presented are from the Fifteenth Decennial Census of 1930 and the Sixteenth Census of 1940.

Conclusions drawn from the data are summarized in 12 propositions as follows: The rural population of Ohio may be divided geographically into fairly distinct areas with widely different levels of living. The level-of-living indexes as constructed for this study were roughly proportional to economic opportunity and population pressure in the different areas. Between 1930 and 1940, the rural population of Ohio tended to shift to greater concentration in the poorest and in the most prosperous areas of the State. Population shifts during the decade of the thirties resulted in increased concentrations of rural people in the youth ages and in the older ages above the 45-yr. level. The greatest percentage increases in the rural-farm population between 1930 and 1940 were among youths in their twenties and among aged people 65 yr. old and over; and among the youths, the increase was much greater for men than for women. Redistribution of the adult rural population of Ohio among the several level-of-living areas of the State was primarily a result of two factors: (1) Differential rates of net migration, and (2) differential rates at which children maturing into the adult ages were replacing adult migrants and decedents. Rural population reproduction rates in Ohio were in inverse ratio to level-of-living indexes in different areas. Redistribution of the population among various age groups is a result of differential replacement rates and differentials in net migration. The most mobile period in the life of rural people is 20–34 yr. The rate of age group replacement in the adult years was very closely associated with net migration; excesses in replacements were associated with net out-migration, and deficits were associated with net in-migration. The outlook is for continuing large-scale net migration, particularly of youth, away from Ohio farms. The more prosperous rural areas as measured by level-of-living indexes do not necessarily offer greater economic opportunities to migrants than do the less prosperous areas.

Culture of a contemporary rural community, Irwin, Iowa, E. O. Moe and C. C. Taylor (*U. S. Dept. Agr., Bur. Agr. Econ., Rural Life Studies No. 5 (1942), pp. 93+, illus. 8*).—This report completes the series of studies on community stability and instability (E. S. R., 89, p. 261).

"The analysis of Irwin community, in Shelby County, Iowa, justifies the placing of a Corn Belt community midway between the extremes of stability and instability. The membership and social life of the community have experienced change from earliest settlement and are still in the process of change, but the type of farming stabilized itself so early in settlement and has remained so constant that there is a high degree of stability in the enterprise of agriculture. Farming and thinking about farming so dominate all members of the community, both farm and nonfarm, that there is a high degree of stability in the midst of constant change."

Education of farm leaders in selected rural counties of North Carolina, S. Winston (*Res. and Farming* [*North Carolina Sta.*], *1* (*1943*), *Prog. Rpt. 2, p. 7*).—This study of 385 leaders in four selected rural North Carolina counties showed that 64 percent had attended college for 1 yr. or more. Of this number, 77 percent were college graduates and over 50 percent had had some graduate work.

FOODS—HUMAN NUTRITION

Food and planning, J. R. Marrack (*London: Victor Gollancz, 1943, pp. 285, illus. 4*).—Sir John B. Orr states in the preface that "this book can be heartily recommended both to the scientist and to the layman. It gives a clear and concise statement of the present position of our knowledge of nutrition with sufficient detail to make it of interest to the highly specialized research worker who wishes to get a view of the whole field of nutrition and of the implications of the new knowledge he has helped to create." The first six chapters deal with the function of the various food nutrients, food requirements and the effect of deficiencies, the nutritive value of foods, food consumption patterns in different countries, and the relation of diet to health as brought out in health statistics and in reports of selective studies. The remainder of the book is devoted to an historical account of food control and supplies in the last war and their effect on health, food planning during the interim between the two wars, the present position (as of 1941–42) of Britain and Germany with respect to food supplies, and a final chapter in which are outlined certain essentials for future "planning for plenty."

[Nutritive values of Hawaiian-grown foods] (*Hawaii Sta. Bien. Rpt. 1941–42, pp. 130–136*).—In this biennial report (E. S. R., 85, p. 268) data are summarized on various food analyses.

Proximate and mineral (total ash, calcium, phosphorus, and iron) analyses are given for headed cabbage, carrots, and sweetpotatoes and mineral analyses for tomatoes. Oxalic acid values are given for 19 vegetables, the data confirming published reports on the relatively high content of oxalates in leaves of certain plants belonging to the Chenopoidiaceae or goosefoot family—beet tops, purslane, and spinach—and showing similarly high values in amaranth (*Amaranthus gangeticus*) and the Malabar nightshade (*Basella rubra*). Taro tops had somewhat less than half as much oxalic acid as amaranth and beet leaves on the fresh cooked basis and sweetpotato tops only about half as much as taro tops. Swamp cabbage and Chinese cabbage contained no oxalic acid or too small an amount to measure.

Preliminary comparisons of Hawaiian and mainland-grown tomatoes indicated no significant differences between the two in ascorbic acid. The mean value of 19 samples of mature-green Maui-grown tomatoes, selected from October to February, was 13 6±0.75 mg. per 100 gm. as compared with 14.7±0.83 mg. per 100 gm. for 12 samples of mainland fruits procured from Honolulu markets between October and December. Two samples of Oahu-grown tomatoes analyzed in February contained 12.8 mg. per 100 gm. and 3 samples of plum tomatoes (a small, heavy fruiting type) analyzed in July and October contained approximately 27 mg. per 100 gm.

The Solo papaya grown in two localities in Oahu gave average ascorbic acid values of 81±1.7 mg. per 100 gm., with a range of from 60 to 122 mg. for 45 samples in one locality and 88±2.5 mg., with a range of from 59 to 118 mg. in another. The aril or fleshy material surrounding the black seeds was considerably richer in ascorbic acid than the fruit. Two samples of papaya baked in an electric oven at 350° F. for from 20 to 25 min. lost 7 and 12 percent, respectively, of their ascorbic acid content, and 7 percent was also lost when papaya was simmered with a little sugar for 20 min.

Mangoes varied widely in ascorbic acid content. The common mango (Manini) had the highest value, 114 mg. per 100 mg., and the Haden and Paheri the lowest, 14 mg. Among all varieties tested, there was a higher ascorbic acid content in the green than the ripe fruit.

Treatment of whole-grain cereals with carbon disulfide resulted in little or no destruction of thiamin. Brown rice in the dry state contained 224 μg., whole-wheat flour 350, and rolled oats 430 μg. of thiamin per 100 gm.

Analyses of two varieties of carrots, Imperator and Danvers Half Long, for glucose, sucrose, and total sugars at four stages of maturity showed increases in sucrose but decreases in total sugars with increased maturity.

Mechanical determination of the juiciness of meat, B. TANNOR, N. G. CLARK, and O. G. HANKINS. (U. S. D. A.). (*Jour. Agr. Res. [U. S.], 66 (1943), No. 11, pp. 403–412, illus. 2*).—The method described involves the use of a specially adapted hydraulic laboratory press for obtaining the expressible juice in samples of meat weighing from 25 to 35 gm. The plates and test cylinders of the press are maintained at a temperature of 50° C., while pressure is gradually increased to a total of 9,800 lb. and held there for 5 min. The juice is collected in a Babcock milk-testing bottle, thus making it possible to determine the fat content of the expressed juice. The difference in weights of the meat sample before and after pressing represents the quantity of expressible juice.

Comparisons of the amounts of juice as thus obtained from adjacent samples of the same muscle and from corresponding samples of the two sides of the same carcass showed no significant difference. Coefficients of correlation between committee scores for juiciness according to the customary subjective tests and the expressible juice content of samples of beef with only slight variations in juiciness, "although not high, were of sufficient magnitude to be encouraging." This was also true of fresh and freezer-stored pork loins. In samples of fresh pork loins, beef ribs and loins, and lamb ribs and loins heated to widely varying internal temperatures, the correlation was close between the judges' scores and the actual quantities of expressible juice. The method proved more reliable than subjective scoring in estimating the relative juiciness of different types of meat. Pork containing 40 percent of expressible juice was judged to be only slightly more juicy than beef or lamb containing 30 percent, and beef and lamb containing 45 and 50 percent, respectively, of expressible juice were judged to have practically the same quantity of juice.

"The proposed method appears to be adaptable for use at least with beef, lamb, and pork when the variation in juiciness is due to animal production factors or to the internal temperatures to which the meat is heated. Possibly investigators will find it useful first as a supplement to and later as a replacement of the technic based on committee scores."

Methods of curing lamb for farm family use in Oklahoma, J. A. Beall and D. I. Purdy (*Oklahoma Sta. Tech. Bul. 17 (1943), pp. 11, illus. 4*).—In this attempt to find the best methods of handling and preserving lamb under farm conditions in the State, comparisons were made of different times and temperatures of chilling the carcass (the leg being used in all cases), including 48 hr. at 35° C., 12 hr. at 35°, 12 hr. at 70°, and no chilling, and of different cures—dry cure and brine of different concentrations. Analysis of the data for 2 yr. indicated that the brine method is more satisfactory than the dry cure and that the longer storage period at cooler temperature gives a better product, particularly in the flavor of the lean. Percentage of shrink was much higher in the dry-cured than the brine-cured, but cooking losses were much less. Salt penetration was a little better in the cure containing stronger concentrations of sodium nitrate or nitrite than those given in Farmer's Bulletin 1172 (E. S. R., 44, p. 471), and there was some indication that 30 days may not be a long enough time for complete cure. Recipes for lamb cured according to recommendations in this publication have been noted (E. S. R., 89, p. 132).

Sugar substitutes in the diet, O. Sheets (*Miss. Farm Res.* [*Mississippi Sta.*], *6 (1943), No. 5, pp. 3, 5, 6, illus. 2*).—Earlier studies of the author and associates have been drawn upon to show the higher nutritive value of various nonrationed sugar substitutes, such as sirups and molasses, than of sugar with respect to calcium and iron (E. S. R., 75, p. 879) and of a number of foods of high iron content with respect to availability of iron (E. S. R., 84, p. 427). The article also contains a nontechnical description of the manufacture of sugar and byproducts and of different types of sirups.

Peanuts for shortening and for seasoning vegetables, H. H. Thompson and J. G. Woodroof (*Georgia Sta. Press Bul. 525 (1943), pp. 2*).—Directions are given for the preparation from peanuts of a paste which can be used for shortening in a wide variety of bakery products and as a seasoning for vegetables. Suggestions are given for alteration of recipes and manipulative processes in both types of use.

Vegetable preservation handbook for wartime use, J. E RICHARDSON and H. L. MAYFIELD (*Montana Sta. Cir. 174 (1943), pp. 22*).—In this handbook, which has been prepared to supply reliable up-to-date information about the preservation of vegetables grown in victory gardens, general instructions are given for preservation by common storage, canning, freezing, dehydration, brining, krauting, and pickling, and the effects of different preservation methods on nutritive values are summarized. Each vegetable is then considered separately with various suitable methods of preservation and a brief statement of their effect on nutritive value. A distinctive feature of the publication is the inclusion of brining as a satisfactory method of preserving certain vegetables. The process is described in general, and specific directions are given for the individual vegetables.

Freezing preservation of North Dakota-grown raspberries, D. KNOWLES, O. GROTTODDEN, and T. E. LONG (*North Dakota Sta. Bimo. Bul. 5 (1943), No. 5, pp. 17–19*).—In varietal tests in which the berries were packed in cold 50 percent sirup (4⅔ cups of sugar to 1 qt. of water), frozen in a locker at a temperature of from 8° to 10° F. and humidity between 98 and 99 percent the first year and from 2.0° to 6.3° and 95.9 to 98.2 percent the second year, and sampled at monthly intervals after 3 months' storage, the Cumberland, Latham, Early June, and Chief varieties were ranked excellent in flavor and color and in texture except for a slight tendency of the Latham to crumble. The Ruddy variety had good color and flavor but tended to crumble badly. Two unnamed seedling selections were definitely inferior in table quality when frozen.

The Ruddy was used in a comparison of different methods of packing, including 50 and 60 percent sugar sirup, dry sugar (1 lb. of sugar to 3 lb. of fruit), and straight (no added sugar or sirup). In a repetition of the trials the second year 40 and 50 percent honey sirup packs were also used. The sirup packs proved superior in quality to the dry sugar or straight packs, with little to choose among the four methods except that the honey packs had a characteristic honey flavor. The dry sugar pack had excellent color and good flavor but was of poor texture. The straight pack samples were of only fair color, poor texture, and decidedly off-flavor.

Freezing preservation of Utah fruit (*Utah Sta. Bul. 306 [1943], pp. 59–60*).—The results of quality tests on varieties of frozen strawberries and raspberries are summarized. Redheart and Corvallis were outstanding in appearance as whole frozen berries and these and Marshall, Dorsett, Fairfax, Grand Champion, Catskill, and Green Mountain stood up well in the judging for shortcake, sundae toppings, and direct dessert use. Of the red raspberries tested, Cuthbert, Marcy, and Taylor were superior when frozen whole in sugar or sugar sirup, with Taylor definitely superior to Cuthbert. High acidity accompanied better and more intensive flavor, with grade A fruit having an acidity of 1.0 percent or better.

Complete book of home canning, including preserving, pickling, dehydration, and jelly-making, D. M. TAYLOR (*New York: Greenberg, [1943], pp. 164+, illus. 16*).—This book contains, in addition to practical directions for the home canning of fruits, vegetables, meats, poultry, and fish, directions for home dehydration; for the preparation of fruits and vegetables for sharp freezing; for jelly-making, with numerous recipes for pickles and relishes, jams, marmalades, and conserves; and for fruit preserves and fruit butters.

Family-living studies [in Hawaii] (*Hawaii Sta. Bien. Rpt. 1941–42, p. 136*).—Calculations from 4-week records of food consumption of 187 families have led to the conclusion that the most common and serious diet deficiencies were inadequate intake of calcium and vitamin B, with lesser deficiencies in vitamins

A and C, iron, and protein. The dental condition of 600 children examined was generally poor, but better in the rural districts of East Maui than in rural Oahu, Kona, and Honolulu. Local and home-grown foods were used more extensively in Maui than in the other localities. In most cases the deficient diets were due to poor choice of foods rather than inadequate funds.

Nutritional status of school children (*Arizona Sta. Rpt. 1942, pp. 64–66*).—Four-hr. saturation tests for thiamin and ascorbic acid were conducted on 67 Spanish-American children of low economic status and 41 American children of high economic status. As determined by the percentage of a test dose of 5 mg. of crystalline thiamin excreted in 4 hr., with an excretion above 6 percent considered normal, only 10 percent of the Spanish-American and 40 percent of the American children were saturated. In the ascorbic acid tests in which the test dose consisted of 100 mg. practically none was excreted by 86 percent of the Spanish-American children and 44 percent of the American children. In the discussion of these findings it is suggested that the low values for thiamin in the Spanish-American group whose diet ordinarily contains dried beans rich in thiamin are due to the loss of thiamin in the customary methods of soaking the beans and cooking them in soda. The long slow cooking methods used by the Mexican families in the preparation of frijoles may also be a contributing factor. The low values in the American group are attributed to the extensive use of patent flour and highly milled cereals. The low C values in both groups are thought to indicate a deficiency in the regular intake of foods rich in vitamin C, although citrus fruits are produced in the State.

The rôle of the amino acids in human nutrition, W. C. Rose, W. J. Haines, and J. E. Johnson. (Univ. Ill.). (*Jour. Biol. Chem., 146 (1942), No. 2, pp. 683–684*).—In this preliminary note the general plan is outlined of a systematic investigation of the amino acid requirements of the human species. Two healthy young men are being maintained on a diet furnishing 7.02 gm. of nitrogen daily, of which more than 95 percent consists of a mixture of 10 amino acids, all other known factors being provided in suitable amounts. After nitrogen equilibrium has been established the indispensability of each of the amino acids is to be tested by withdrawing it from the diet, increasing the content of the others sufficiently to provide a constant nitrogen intake.

The withdrawal of valine was promptly followed by a profound upset in nitrogen balance. In 4 days the nitrogen output exceeded the intake by 2.19 and 2.91 gm., respectively, for the two subjects. On restoring the valine, positive balances were quickly established. A similar trial with methionine also led to negative nitrogen balances, although the effect was not as great as with valine.

The effect of varying the level of calcium in the diet on the growth and well-being of the adult rat, B. Bisbey and E. Dyar (*Missouri Sta. Bul. 457 (1942), pp. 74–76*).—The substitution of one-sixth whole wheat for one-sixth whole milk at 120 days in the familiar one-third milk-two-thirds whole wheat diet of rats had no effect on growth or condition of the animal or on calcification of the body at 300 days. However, the number of young born in later litters and the weights of the young after 14 days of age were affected adversely. In further studies it was shown that reduction of calcium in the diet of the females through the smaller proportion of milk was responsible for these effects. A continued high level of calcium in the diet of the lactating rat was necessary for growth and calcification in the young. No deleterious effects of reducing the level of calcium in the diet of the male rats were observed, although the percentages of calcium in the body were reduced.

Transmethylation as a metabolic process in man, S. Simmonds and V. du Vigneaud (*Jour. Biol. Chem., 146 (1942), No. 2, pp. 685–686*).—The announcement is made, with a brief summary of experimental data, that by the isotope technic it has been established that the methyl group of dietary methionine can be used by man in the synthesis of choline and creatinine as previously demonstrated by du Vigneaud et al. in rats (E. S. R., 87, p. 745).

The carotene and ascorbic acid contents of chile and the effect of drying and canning on these factors (*New Mexico Sta. Rpt. 1942, pp. 63–64*).—Tabulated data are given on the range and mean values of carotene and ascorbic acid in a number of varieties of peppers at different stages of maturity and in products prepared from them. "With the exception of two varieties, all the green peppers tested were very good sources of carotene, and the carotene content increases greatly as the peppers ripen. Both the green and ripe peppers are rich in ascorbic acid, but the increase in ripening is much less marked than the increase in carotene. Loss of ascorbic acid during cooking or drying is much greater than the loss of carotene. Drying chili causes greater loss of carotene and ascorbic acid than canning, and the destruction of both vitamins in the dried chili continues during storage. Shortening the drying time of chili by cutting or slitting the pod or by removing the stem end assists in the retention of both carotene and ascorbic acid."

As an illustration of the change in values on ripening, samples of a variety of chili designated as Chile No. 9 gave a mean carotene value of 4.9 μg. per gram in the green stage and 119.3 μg. in the red stage. The mean content of ascorbic acid was 254 mg. per 100 gm. in the green, 308 mg. in the partially ripe, and 326 mg. per 100 gm. in the red stage.

Pecans as a source of vitamin B_1 and B_2 (*Arizona Sta. Rpt. 1942, pp. 67–69*).—Data are summarized on the thiamin content as determined by the bio-assay technic of Booher and Hartzler (E. S. R., 83, p. 131) and the thiochrome method of Conner and Straub (E. S. R., 87, p. 9) and on the riboflavin content by the Conner and Straub method of four varieties of pecans. Because of the high fat content of the pecans, it was necessary to extract the material in a Soxhlet extractor before digestion with clarase in the chemical tests. The two varieties, Halbert and Mahan, in which both bio-assays and chemical determinations of thiamin were made, showed good agreement by the two methods, with values of 550 and 533 μg., respectively, per 100 gm. for the Halbert and 950 and 944 μg., respectively, for the Mahan. The relative values for riboflavin were reversed, the Halbert with its low content of thiamin having a much higher content of riboflavin, 184 μg. per 100 gm., than the Mahan, 63 μg. per 100 gm. The Western Mesa variety, tested only chemically, had a thiamin content of 800 μg. and a riboflavin content of 71 μg. per 100 gm. The Humble variety gave a value of 500 μg. of thiamin per 100 gm. as determined by bio-assay. In comparison with reported values for other foods, pecans are considered to be an excellent source of thiamin and a relatively poor source of riboflavin.

Gallstone formation and intake of B vitamins in cholesterol-fed guinea pig, R. Okey. (Univ. Calif.). (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 3, pp. 349–350*).—In this preliminary note attention is called to a high incidence of gallstones observed in guinea pigs on a diet in which there were slight additions of riboflavin and pantothenic acid to a trial diet which had supported growth only slightly less well than the usual stock diet of the laboratory and with no production of gallstones. Examination of autopsy notes for guinea pigs in earlier studies showed that all of the animals which had gallstones had been on diets which probably contained extra riboflavin.

"The whole problem of the relationship of the intake of B vitamins to tolerance for foods high in cholesterol obviously needs further investigation. Preliminary publication of our findings seems desirable at this time because of the wide and indiscriminate use of very high dosages of preparations of the various B factors."

Vitamin interrelationships.—II, Thiamine and riboflavin interrelationships in metabolism, B. Sure and Z. W. Ford, Jr. (Ark. Expt. Sta.). (*Jour. Biol. Chem., 146 (1942), No. 1, pp. 241–250*).—In this continuation of the series (E. S. R., 81, p. 874), thiamin and riboflavin interrelationships were studied for the most part by the paired-feeding technic, as described by Sure and Dichek (E. S. R., 86, p. 426). The procedures followed in the chemical methods for the determination of both thiamin and riboflavin are described in detail.

During thiamin depletion there was not only a marked reduction of thiamin excretion in the urine but also from two- to sevenfold increases in riboflavin excretion. No significant differences were found in the fecal excretion. There was a marked reduction in the thiamin content of all of the organs and endocrines, with the greatest losses in the liver, kidney, heart, and thymus. There were also appreciable losses of riboflavin in the lungs, ovaries, and muscle and small losses in the other tissues. In riboflavin deficiency there were marked reductions of riboflavin in all of the body tissues, but no disturbances in thiamin metabolism.

"The results of this investigation may have considerable human application. Since it is now generally recognized that thiamin deficiency is widespread in this country, it is quite possible that borderline riboflavin deficiencies may exist not only from inadequate riboflavin intake but also from poor utilization of the latter vitamin caused by thiamin deficiency. On the other hand, a diet abundant in thiamin may prevent riboflavin deficiency produced by insufficient riboflavin intake. These are, however, problems for the clinicians to solve."

Effect of vitamin deficiencies on basal metabolism and respiratory quotient in rats, D. Orsini, H. A. Waisman, and C. A. Elvehjem. (Wis. Expt. Sta.). (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 1, pp. 99–102*).—Data are reported on the basal metabolism, as determined in the apparatus described by Schwabe, Emery, and Griffith (E. S. R., 80, p. 272), and the R. Q. of normal rats and others with riboflavin, pyridoxin, and pantothenic acid deficiencies produced on rations developed by Mannering, Lipton, and Elvehjem (E. S. R., 86, p. 425), Conger and Elvehjem (E. S. R., 86, p. 427), and Henderson et al. (E. S. R., 87, p. 893), respectively.

No significant differences from normal in the basal metabolic rates were observed in the animals deficient in riboflavin or pantothenic acid, but those on the pyridoxin-deficient ration showed a definite decrease in basal metabolic rate expressed on the basis of surface area. In all of the deficiencies studied there was a definite increase in R. Q. Incomplete combustion of the intermediate metabolites is suggested as a possible explanation of these increases.

Biotin deficiency in the rat, G. A. Emerson and J. C. Keresztesy (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 3, pp. 358–361, illus. 2*).—In this study, in which the authors had the technical assistance of E. Zitcer and E Wurtz, a symmetrical achromotrichia the pattern of which was the reverse of that observed in pantothenic acid deficiency, was obtained in black rats on rations containing dried, fresh egg white after curative therapy had been initiated by feeding small amounts of biotin. In a comparison of several diets for producing the biotin deficiency syndrome, it was found that the addition of 2 percent dried liver to a diet containing 15 percent dried egg white and 15 percent casein hastened the appearance of signs of biotin deficiency, these developing within less than 4 weeks. Response to biotin supplements in doses of from 0.5 to 2 μg. was rapid.

Within 3 days the erythema in various areas and the scaly dermatitis of the abdomen began to disappear, and after a week abnormality in locomotion was no longer evident. In all but 1 of the 30 black rats observed symmetrical graying of the ingrowing fur was evident after 12 days of supplementation. This persisted to some extent even after 5 weeks of therapy.

Cure of paralysis in rats with biotin concentrates and crystalline biotin, E. NIELSEN and C. A. ELVEHJEM. (Wis. Expt. Sta.). (*Jour. Biol. Chem., 144 (1942), No. 2, pp. 405–409, illus. 2*).—Paralysis or spasticity of the hind legs of rats maintained on the egg white ration on which "spectacled eye condition" was shown to develop (E. S. R., 87, p. 559) was found to respond also to biotin therapy. Attention is called to a similar paralysis reported by Mannering et al. (E. S. R., 86, p. 425) to have been produced in rats maintained on a ration low in riboflavin and exaggerated by high levels of fat. The paralysis in the present study was not corrected by riboflavin, but the suggestion is made, based on unpublished observations that riboflavin is necessary for optimum synthesis of biotin in the intestinal tract of rats. that in the earlier study the riboflavin-low ration may have produced a mild biotin deficiency. Sensitivity to handling in the lumbar region of the spine is noted as characteristic of both biotin-deficient and riboflavin-deficient rats. The paralysis was not due to low creatine levels as observed by various investigators in muscle dystrophy of vitamin E-low rats. On the contrary the muscle creatine of biotin-deficient rats was abnormally high and was decreased by the administration of biotin.

Pathological studies of acute biotin deficiency in the rat, J. H. SHAW and P. H. PHILLIPS. (Wis. Expt. Sta.). (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 3, pp. 406–407*).—Observations are reported on the pathology of the thymus, testis, epididymis, skin, and muscles of rats in which an acute biotin deficiency had been produced in the above noted study of Nielsen and Elvehjem. The thymus was smaller than in the controls and histologically showed signs of early involution and connective and adipose tissue infiltration. The testis and epididymis showed degenerative atrophy similar to that previously observed in riboflavin and pantothenic acid deficiency (E. S. R., 87, p. 314). No degeneration of the spinal cord and peripheral nerves was observed in spite of the extreme spasticity occurring in many of the animals. It is thought that the paralysis, although grossly similar to that obtained in riboflavin deficiency, is not due to a neural lesion.

The growth-promoting effect of folic acid and biotin in rats fed succinylsulfathiazole, E. NIELSEN and C. A. ELVEHJEM. (Univ. Wis.). (*Jour. Biol. Chem., 145 (1942), No. 2, pp. 713–714*).—It is noted briefly that biotin and folic acid, particularly the latter, are effective in counteracting the growth inhibition by succinylsulfathiazole (sulfasuxidine) in rats on a synthetic ration noted by Black et al. (E. S. R., 88, p. 854).

Ascorbic acid content of strawberries and their products, H. L. MAYFIELD and J. E. RICHARDSON (*Montana Sta. Bul. 412 (1943), pp. 16*).—Two standard varieties were used in this study, the Dunlap and the Gem, an everbearing variety. In each test the ascorbic acid content was determined on numerous individual berries by the Bessey method with an Evelyn photoelectric colorimeter. Minimum, maximum, and average values for the Dunlap 1940 season were 65, 89, and 79 mg. per 100 gm. and 1941 season 52, 86, and 64 mg. per 100 gm. Values for berries of the Gem variety were 69, 89, and 80 mg. per 100 gm. at the height of the first bearing period, 56, 91, and 67 mg. at the end of the first bearing period, and 49, 77, and 61 mg. per 100 gm. at the height of the second bearing period. Fresh berries of both varieties showed no appreciable loss in ascorbic acid when held as long as 5 days in the hydrator of an electric refrigerator or 2 days at a room temperature of 75° F. Strawberries washed before hulling lost less ascorbic acid than when hulled first. Sliced berries held 30 min. at 75° with and without sugar and 24 hr. at 40° in a gelatin medium lost no significant amounts of ascorbic acid. Quick-frozen berries either in a dry sugar pack or sugar sirup pack were tested at intervals of 2 mo. up to 6 mo., the berries being allowed to thaw at room temperature for about 30 min. before testing. In all cases there was a progressive loss of ascorbic acid, amounting to about 50 percent in 4 mo. and 70 percent in 6 mo. of freezing storage. Values are also reported for berries of both varieties preserved in various ways and tested after different storage periods. The canning process in itself caused a loss of about 50 percent of the original vitamin content, and this was increased on storage to about 80 percent. Strawberry preserves, jams, and jellies showed similar initial and progressive losses.

From the various data obtained, calculations have been made of the average ascorbic acid content in ordinary servings of fresh strawberries and strawberry products. These show a range of from 70 mg. for a serving of fresh strawberries to 7 mg. for a serving of strawberry preserves.

Effect of fertilizer and environment on the ascorbic acid content of turnip greens, R. Reder, L. Ascham, and M. S. Eheart. (Okla. Expt. Sta. et al.) (*Jour. Agr. Res.* [*U. S.*], *66* (*1943*), *No. 10, pp. 375–388, illus. 1*).—This contribution from the Oklahoma, Georgia, and Virginia Experiment Stations, with assistance from the Virginia Truck Experiment Station and the U. S. Regional Vegetable Breeding Laboratory, is designated as Paper No. 1 of the Southern cooperative project Variations in the Composition and Nutritive Value of Vegetables Grown in the South.

Cooperative experiments were conducted in a uniform manner at four locations, Stillwater, Okla., Experiment, Ga., and Norfolk and Blacksburg, Va., to study the effects of fertilizer treatment, soil composition, and climatological conditions on the ascorbic acid content of turnip (*Brassica rapa*) greens, variety Seven Top. Four fertilizer factors, N, P, K, and Ca, were studied in a 2×2×2×2 factorial design consisting of 16 treatments (all possible combinations of the four factors at a high and low level for each nutrient) and two replications at each location.

Of the 15 fertilizer treatments studied, 3 single fertilizers, N, P, and K, and 2 combinations, NP and NCa, gave significant effects at one or more places. The most consistent results were obtained with potassium, which produced decreases in ascorbic acid in all experiments. These decreases were significant at three places and highly significant for the combination of places. The average decrease was 8.2 mg. of ascorbic acid per 100 gm. of fresh material for 480 samples treated with fertilizer containing potassium, as contrasted with an equal number of samples not fertilized with potassium. Nitrogen fertilizer gave increases in ascorbic acid at two places (significant at one), significant decreases at two places, and a significant decrease for the combination of all places. The interaction of N treatment×places was highly significant. NCa fertilizer produced decreases in ascorbic acid at all places, significant at one, and the decrease effected was significant for the combination of four places. Phosphorus and NP each produced a significant increase in one location, but the effect of neither of these was significant for the four locations combined.

The mean ascorbic acid contents of the greens at Blacksburg, Stillwater, Experiment, and Norfolk, were 1.284, 1.579, 1.907, and 2.410 mg. per gram, respectively. The influence of place was 13.75 times as great as the most important average effect produced by fertilizer treatment, i. e., potassium treatment. Variations in the ascorbic acid content of the greens produced at different locations did not appear to be directly related to differences in soil composition or to differences in temperature.

In addition to the effects produced by fertilizer treatment, there was some evidence that the formation of ascorbic acid was also affected by light intensity and rainfall.

Changes in quality of shelled green peas (*Maryland Sta Rpt. 1941, p. 32*).—In this progress report it is noted briefly that peas shelled in a viner and held showed marked bacterial growth and definite souring in 5 hr., but no apparent loss in vitamin C until after 8 hr. Unshelled peas held for 28 hr. showed no significant loss of vitamin C. Blanching peas for 1 min. at 100° C. destroyed the majority of the bacteria present, but resulted in a 32-percent loss of vitamin C. Among the several cultures of bacteria isolated from peas, the majority were found capable of destroying vitamin C, while others appeared to protect the vitamin for a considerable time.

[Vitamin studies at the Utah Station] (*Utah Sta. Bul. 306 [1943], pp. 75–76*).—Miscellaneous items are included in these progress notes as follows:

In two varieties of peas shelled, held at room temperature, and tested at intervals from 9 a. m. to 4 p. m., no losses in ascorbic acid were noted. Samples taken at the same time were blanched, frozen, and stored. Approximately 1 yr. later they were found to have retained from 73 to 80 percent of their ascorbic acid content.

Several varieties and strains of lima beans, blanched and frozen without delays, had ascorbic acid values ranging from 16 to 29 mg. per 100 gm. The green beans had higher ascorbic acid values than the white and the small beans higher values per unit weight than large ones of the same variety.

Tomato varieties with an ascorbic acid content of from 20 to 25 mg. per 100 gm. as tested in two consecutive seasons included Baltimore, Earliana, and Clark Early Special. Varieties with ascorbic acid content of from 20 to 25 mg. the first season and from 25 to 28 mg. the second were Valiant, Marglobe, Early Bison, Scarlet Dawn, and Stokesdale. The Cardinal variety had values in the latter range in both seasons.

HOME MANAGEMENT AND EQUIPMENT

Rural family spending and saving in wartime (*U. S. Dept. Agr., Misc. Pub. 520 (1943), pp. 163+*).—The material presented in this volume was obtained from a study conducted in 1942 by the U. S. D. A. Bureau of Home Economics in areas representing the entire rural population of the country. This survey and a similar one of the income and expenditures of urban families and single consumers conducted at the same time by the U. S. Bureau of Labor Statistics were based on plans developed cooperatively by the two agencies and reviewed by the Division of Statistical Standards of the Bureau of the Budget. In the choice of questions to be included and the selection of data for tabulation preference was given to information needed by the Federal Government for wartime planning in regard to problems of tax policy, control of inflation, allocation of supplies, rationing of consumer goods, and food production and distribution. The scope of the study, sampling procedures, collection of schedules, nature of data obtained, and the tabulation and evaluation of the data are discussed in the first 23 pages. The rest of the volume consists of the tabulated data without comment.

As stated in the foreword, by L. Stanley, "this volume presents significant facts concerning the welfare of the rural populatiion of the United States in a period when agricultural production was approaching an all-time high record, when the ratio of prices received to prices paid by farmers was approaching parity, when the forces of production and distribution were not as yet dislocated by the extreme demands of a wartime economy. The fact that half the farm families in this period of great agricultural production received $750 or less in net money income and that even with the added value of goods produced and consumed at home this amount could be increased only to $1,280 should be significant to those who are thoughtful about the future of the American farm family."

Consumer-business relations, M. G. Reid. (Iowa State Col.). (*Jour. Home Econ., 34 (1942), No. 9, pp. 655–658*).—This paper is based on a talk presented at the 1942 meeting of the American Home Economics Association.

Performance of combination range ovens: Coal-electricity and coal-bottled gas, L. J. Peet and A. Pattison. (Iowa State Col.). (*Jour. Home Econ., 35 (1943), No. 3, pp. 168–172, illus. 2*).—This study was conducted on three ranges, two of which had the oven designed for the use of coal and compressed liquefied gas and the other coal and electricity. The tests included determinations of preheating time at various thermostat settings, the ability of the oven to maintain constant temperature, temperature distribution within the oven and on certain exterior surfaces, rate and time for cooling to 200° F, performance in baking white layer cakes, and use of the two fuels simultaneously, preheating with wood or coal. Details are given for the various tests, and the data obtained are reported in tables and charts. Observations to aid the homemaker in the selection and operation of combination range ovens include the following:

It is possible to get satisfactory performance from a combination oven, using the coal (or wood) for preheating and then turning on the gas or electricity for heat control. If the thermostat is located too near the firebox it tends to react before the temperature indicated on the dial setting actually exists in the oven Gas ovens require more space for air circulation around the pans than do coal-heated ovens Identical directions cannot be followed with the two fuels. When baking with coal alone the pans may have to be placed on the floor of the oven, and a slightly lower temperature or shorter baking time is required than with the other fuels. Oven construction that does not require removal of parts for change from one fuel to another is convenient, but if removable parts are necessary, storage space for them in the range is desirable.

REPORTS AND PROCEEDINGS

Fifty-third Annual Report [of Arizona Station], 1942, P. S. Burgess and R. S. Hawkins (*Arizona Sta. Rpt. 1942, pp. 93+, illus. 5*).—In addition to work abstracted elsewhere in this issue and a climatological summary, reports of progress are presented on the year's research in agricultural chemistry and soils, agricultural economics and rural sociology, agricultural engineering, agronomy, animal husbandry, animal pathology, botany and range ecology, dairy husbandry, entomology and economic zoology, horticulture, human nutrition, plant breeding, plant pathology, and poultry husbandry.

Agricultural science on the war front: Report of the Hawaii Agricultural Experiment Station for the biennium ending June 30, 1942, J. H. Beaumont et al. (*Hawaii Sta. Bien. Rpt. 1941–42, pp. 149, illus. 25*).—In addition to work abstracted elsewhere in this issue, reports of progress are presented for investigations with cattle and swine, poultry and rabbits, parasitology, soils, plant physiology, agronomic crops, fruits and nuts, vegetable crops and diseases, entomology, and nutrition.

Report on agricultural research [of Iowa Station] for the year ending June 30, 1942, I, R. E. Buchanan et al. (*Iowa Sta. Rpt. 1942, pt. 1, pp. 293, illus. 49*).—In addition to the usual administrative data, this includes four special reports entitled Soybeans Through 30 Years at the Iowa Station, A Decade of Progress in Seed Technology at the Iowa Station, Cheese Research at the Iowa Station, and This Station's Agricultural Economics Research and the War, and project reports on the research work of the year in the sections of agricultural engineering, agronomy, animal husbandry, bacteriology, botany and plant pathology, chemistry, dairy industry, entomology and economic zoology, forestry, home economics, horticulture, rural social science, and statistics.

Science at work for the farmer: Fifty-fourth Annual Report of the [Maryland] Agricultural Experiment Station, 1940–1941, R. B. CORBETT ET AL. (*Maryland Sta. Rpt. 1941, pp. 70+, illus. 14; Bul. Sup., pp. [379], illus. 58*).—This report, issued both separately and with Bulletins 435–441, summarizes the work of the year under the general headings of economics on the farm; farm machinery and equipment; farm crops, soil, and seed inspection; beef cattle, sheep, hogs, and horses; diseases of animals; bacteria affect the farm; plants and their diseases; dairy cows and dairy products; insects on the farm; fruit and vegetable crops; and poultry.

Annual Report of the Massachusetts Agricultural Experiment Station, 1942, F. J. SIEVERS ET AL. (*Massachusetts Sta. Bul. 398 (1943), pp. 64*).—In addition to work noted on page 411 this report presents recent results in agricultural economics, agronomy, animal husbandry, bacteriology, botany, chemistry, dairy industry, engineering, entomology, floriculture, home economics nutrition, horticultural manufactures, olericulture, pomology, poultry husbandry, and veterinary science and at the Cranberry Station and Waltham Field Station.

Fifty-fifth Annual Report of the [Michigan Station], 1942, V. R. GARDNER (*Michigan Sta. Rpt. 1942, pp. 111–127*).—In addition to work noted on page 447, this report presents briefly some of the findings of the year on breed v. intrabreed differences in sheep, the relation of nutrition to necrotic enteritis in swine, hormone influence on fat secretion by dairy cows, the New Huron oat, producing chicory seed in Michigan, influence of ultraviolet light on the palatability of beef, an effective rabbit repellent, a control measure for the rose chafer, and the yellow leaf disease of sour cherry.

The agricultural experiment station serves the people: Work of the [Missouri] Agricultural Experiment Station during the year ending June 30, 1940, M. F. MILLER, S. B. SHIRKY, H. J. L'HOTE, ET AL. (*Missouri Sta. Bul. 457 (1942), pp. 119*).—In addition to an article noted on page 502, brief summaries are given on work in agricultural chemistry, agricultural economics, agricultural engineering, animal husbandry, botany, dairy husbandry, entomology, field crops, home economics, horticulture, poultry husbandry, soils, and veterinary science.

Fifty-third Annual Report [of New Mexico Station, 1942], F. GARCIA (*New Mexico Sta. Rpt. 1942, pp. 78, illus. 12*).—In addition to work noted elsewhere in this issue, progress results of the year are presented for the departments of agricultural economics, agronomy, animal husbandry, biology (including codling moth investigations), chemistry, dairy husbandry, home economics, horticulture, irrigation, and poultry husbandry.

Fifty-fifth Annual Report [of Cornell Station], 1942, C. E. LADD ET AL. (*[New York] Cornell Sta. Rpt. 1942 pp. 77–176*).—In addition to work noted on page 484 of this issue, this section of the report deals with the progress of investigations in agricultural economics, agricultural engineering, agronomy, animal husbandry, botany, dairy industry, entomology, floriculture and ornamental horticulture, forestry, plant breeding, plant pathology, pomology, poultry husbandry, rural sociology, vegetable crops, and zoology.

[Research in economics of the household and household management, foods and nutrition, and institution management by the Cornell Station] (*N. Y. State Col. Home Econ., Cornell Univ., Ann. Rpt., 17 (1942), pp. 15–16, 17–20*).—Summaries are given of work completed during the year.

Agricultural research in Utah: [Biennial Report of Utah Experiment Station, 1941–42], R. H. Walker (*Utah Sta. Bul. 306 (1942), pp. 110 illus. 7*) —This progress report on projects under investigation during the biennium includes three articles abstracted elsewhere in this issue; an analysis of the economic problems of Utah agriculture; data on crops and soils, fruit and vegetable production, irrigation, and nutrition; and cricket and grasshopper studies.

Epistle to the farm: [Biennial Report of West Virginia Station, 1941–42], C. R. Orton (*West Virginia Sta. Bul. 307 (1943), pp. 56+, illus. 12*).—Recent findings are briefly noted on work in farm crops and soils, fruits and vegetables, animal husbandry, plant disease and insect control, nutrition, economics, and forestry.

MISCELLANEOUS

George Washington Carver: An American biography, R. Holt (*Garden City, N. Y.: Doubleday, Doran and Co., 1943, pp. 342+, illus. 15*).—A sympathetic narrative of Dr. Carver's life and work, with major emphasis on his accomplishments for southern agriculture and Negro betterment at Tuskegee Institute.

The determination of L. D. 50 and its sampling error in bio-assay, E. B. Wilson and J. Worcester (*Natl. Acad. Sci. Proc., 29 (1943), No. 2, pp. 79–85*).—In the bio-assay problem there are two procedures in the literature, viz, the probit and the 50 percent end-point methods. A biometrical study of these is presented.

Bio-assay on a general curve, E. B. Wilson and J. Worcester (*Natl. Acad. Sci. Proc., 29 (1943), So. 5, pp. 150–154*).—A mathematical treatment of the subject with numerous formulas.

A table determining L. D. 50 or the fifty per cent endpoint, J. Worcester and E. B. Wilson (*Natl. Acad. Sci. Proc., 29 (1943), No. 7, pp. 207–212*).—This table is offered in continuation of the above mathematical presentations.

Mississippi Farm Research, [April 1943] (*Miss. Farm Rec. [Mississippi Sta.], 6 (1943), No. 4, pp. 8, illus. 3*).—In addition to articles noted elsewhere in this issue, there are included Household Equipment and Management Related, by D. Dickins (pp. 1, 7), and Hints to Beekeepers, by C. Lyle (p. 8).

Bimonthly Bulletin, [May 1943] (*North Dakota Sta. Bimo. Bul., 5 (1943), No. 5, pp. 39, illus. 6*).—In addition to articles noted elsewhere in this issue and three reviews, this number contains Pasteurization of Cream for Buttermaking, by C. Jensen (pp. 15–16); Ringworm of Cattle, by J. O. Foss (pp. 22–23); Facts About North Dakota's Corn Crop, by H. L. Walster (p. 26); Timely Tips on Grain Storage, by T. E. Long and H. S. Telford (p. 27); Grow Good Chicks, by G. P. Goodearl (pp. 28–30); and North Dakota Farm Prices, by P. V. Hemphill (pp. 38–39).

British agricultural research: Rothamsted, E. J. Russell (*London and New York: Longmans Green & Co., 1942, pp. 32+, illus. 8*).—This is an account of the history and development of Rothamsted (E. S. R., 71, p. 145). prepared in connection with the completion as of June 1943 of its first century of operation.

NOTES

Tuskegee Institute.—According to a note in *Science*, appropriations have been made by the Alabama Legislature of $100,000 annually to the institute to be used in teaching graduate work in agriculture and home economics and such other subjects as the board of trustees deems advisable.

Under an act of Congress approved by President Roosevelt on July 14, 1943, the appropriation of not to exceed $30,000 has been authorized to establish the George Washington Carver National Monument. The Secretary of the Interior is directed to acquire by gift, purchase, or condemnation the site of the birthplace of Dr. Carver (E. S. R., 88, p. 427), located near Diamond, Mo., with such additional land and improvements as he may deem necessary to carry out the purposes of the act and to maintain a museum for relics and records pertaining to Dr. Carver and for other articles of national and patriotic interest.

Idaho Station.—Studies begun about 10 years ago on methods of producing industrial alcohol from farm crops have been brought to the commercial stage. The experimental pilot plant set up in 1937 at Idaho Falls under a State appropriation of $20,000 has been sold to a New Jersey corporation under an agreement to retain and operate it in Idaho. An expansion to 20,000 gal. daily capacity is contemplated, using as raw material the waste from dehydrated potato manufacture. The proceeds from the sale are to be used in further research on the utilization of agricultural off-grade and waste materials.

Michigan College.—Reuben V. Gunn, extension professor of agricultural economics since 1927, died June 2 at the age of 56 years. He had also been associated with farm management work at the University of Wisconsin and the Oregon College.

Minnesota University and Station.—Arthur G. Ruggles, professor of entomology, station entomologist, and State entomologist, retired on June 30 after over 40 years of service to the institution.

Montana College and Station.—Dr. R. R. Renne, head of the department of agricultural economics and rural sociology, has been designated acting president as of September 1. D. L. McDonald who has been serving as acting professor of agricultural education, has resigned to become specialist in agricultural education in the U. S. Office of Education. Other resignations include G. H. Craig as associate professor and associate in agricultural economics to become a senior agricultural economist in the U. S. D. A. Food Distribution Administration and Roy E. Huffman as instructor and assistant in agricultural economics to accept a commission as ensign in the U. S. Naval Reserve. Dr. E. A. Tunnicliff, associate veterinary pathologist, has been granted leave of absence for work in China under the Division of Cultural Relations of the U. S. Department of State. Dr. M. M. Afanasiev, assistant botanist and bacteriologist, has been appointed an agent in the U. S. D. A. Bureau of Plant Industry, Soils, and Agricultural Engineering to give about half time to cooperative kok-saghyz investigations at the station.

Cornell University and Station.—Dr. Carl E. Ladd, dean of the College of Agriculture since 1932, died June 23 at the age of 55 years. A native of New

York, his higher education was obtained at the university, and his services were rendered almost exclusively there and at other institutions in the State. As the *Station News* well says, "Dean Ladd's death brings to a close altogether too soon a career singularly devoted to one purpose—the achievement of everything that might enhance prosperity and happiness on the farms of New York State. The record of his efforts in this direction was so unique and clear-cut that it in itself will serve as a monument to his memory." He was widely known for his leadership in farm management, agricultural extension, resident instruction, and research, to all of which he made material contributions.

Dr. R. B. Hinman, recently retired as professor of animal husbandry on account of ill health, died July 25 at the age of 55 years.

New York State Station.—Dr. M. W. Yale has resigned as assistant professor of bacteriology to accept an appointment in the research department of a cheese company in Wisconsin Dr. John I. Shafer, instructor in botany in the Cornell University and Station, has been appointed assistant professor of vegetable crops.

Pennsylvania Station.—The sum of $130,000 has been specifically appropriated by the State for the support of agricultural research at the station for the biennium beginning June 1, 1943. It is understood this appropriation is in addition to the amount made available for agricultural research from the general appropriation to the college.

Dr. Martin L. Odland, assistant professor and assistant in vegetable gardening at the Connecticut College and Storrs Station, has been appointed associate professor of vegetable gardening vice E. M. Rahn, resigned to go into commercial vegetable growing

South Dakota College and Station.—Members of the staff to join the armed forces within the past 6 months include W. H. Burkitt, instructor and assistant in animal husbandry; David Williams, assistant poultry husbandman; Virgil H. Wintrode, assistant in agricultural economics; Guilford C. Gross, assistant professor of pharmacy and pharmaceutical chemist; and Dr. N. P. Larson, assistant professor and assistant in entomology. New members recently added include C. R. Hoglund, assistant agricultural economist; Twila Paulsen, technical assistant; Russell Hilmoe, assistant analyst in chemistry; and Gene Harney, assistant editor.

Utah Station.—An appropriation of $75,000 for special research was made by the last legislature. Work to be undertaken will include the establishment of a laboratory in the central part of the State for the diagnosis and investigation of livestock and poultry diseases; enlarging the program in animal husbandry research; continuance of weed-control investigations; enlarging the horticultural and tomato-disease-investigation programs; studying the causes of honeybee losses; and for the production of disease-free seed, particularly of potatoes, cereals, and biennial vegetable crops.

Bibliography of Agriculture.—Beginning with its July 1943 issue, Sections A to F of this publication of the U. S. D. A. Library are combined and issued as a single monthly publication organized in three parts—(1) publications received in the Library, including a section on State agricultural experiment station publications; (2) periodical literature, classified by subjects; and (3) author and subject indexes. The scope has been broadened to include human nutrition, animal industry, and other agricultural subjects not previously covered. Free distribution is limited to Federal, State, and other public agencies, but others may purchase the publication from the Superintendent of Documents, Government Printing Office, Washington, D. C., for $3.75 per annum.

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EXPERIMENT STATION RECORD

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RECENT WORK IN AGRICULTURAL SCIENCE[1]

AGRICULTURAL AND BIOLOGICAL CHEMISTRY

Preparation of purified inorganic compounds for use in spectrographic standards, R. C. Hughes. (Fla. Expt. Sta.). (*Jour. Opt. Soc. Amer., 33 (1943), No. 1, pp. 49–60, illus. 7*).—Suitable methods for preparation of purified compounds of magnesium, calcium, potassium, sodium, and silicon are described in detail. The relative efficiency, convenience, and cost of various methods is compared, and the probable usefulness of other methods indicated.

Spectrographic analysis of rat tissues for ingested vanadium, E. P. Daniel, E. M. Hewston, and M. W. Kies. (U. S. D. A. et al.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 921–922, fig. 1*).—Chromium is employed as an internal standard in the arc spectrum, and use is made of standard reference curves established by plotting the ratios of line blackening produced by standard solutions of vanadium and chromium against the concentrations of vanadium. The spectrum lines, vanadium 3,185.406 a. u. and chromium 3,188.0 a. u., were measured by means of a nonrecording densitometer.

Color-order systems, Munsell and Ostwald, M. E. Bond and D. Nickerson. (U. S. D. A. et al.). (*Jour. Opt. Soc. Amer., 32 (1942), No. 12, pp. 709–719, illus. 9*).—The authors give a brief account of the history and of the principal characteristics of the two systems, with some suggestions as to their comparative value for various uses.

Tests for quality in egg pulp.—I, A preliminary note on the application of the reductase test using resazurin as the indicator, W. J. Scott and J. M. Gillespie (*Jour. Council Sci. and Indus. Res. [Austral.], 16 (1943), No. 1, pp. 15–17, illus. 1*).—A high level of significance and a close correlation (−0.98) was attained between the plate count and the reduction time in minutes when the resazurin test was used on egg pulp at 30° C. The reduction time of the pink color afforded a reliable prediction of the bacterial content of egg pulp.

A chromatographic adsorption method for the estimation of the provitamin A content of foodstuffs, G. B. Ramasarma, D. N. Hakim, and S. D. Rao (*Cur. Sci. [India], 12 (1943), No. 1, pp. 21–22*).—Chromatographic separation of carotene and lycopene from xanthophylls and cryptoxanthin in extracts of foods was effected by use of a column of activated dicalcium phosphate. The cryptoxanthin, only weakly adsorbed, was easily separated from the xanthophylls by further development of the chromatogram. The solution containing the unadsorbed carotene and lycopene was chromatographed over a column of alumina, which served to differentiate the several carotene pigments into distinct bands which were eluted separately, thus permitting identification of the different pigments and estimation of their concentrations. Vitamin A activity in International Units was estimated from the formula I. U.=(μg. β-carotene÷0.6)+(μg. other provitamins÷1.2). Vitamin A assays by the above procedure, with estimations of pigment concentration made on petroleum ether solutions in a visual spectrophotometer, were made for papayas, coriander seeds, dry chilies, gingelly seeds, whole wheat, horse gram, mace, and fenugreek seeds. These values, together with those for total carotene and carotene fractions are reported in comparison with carotene values determined by employing the petroleum ether-methyl alcohol phase partition method for separating carotene from xanthophyll. The high values obtained by this latter method suggested that it did not serve to selectively determine carotene.

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[1] The publications abstracted in these columns are seldom available for distribution by the Office of Experiment Stations. In general, application should be made to the Office of Information of the U. S. Department of Agriculture, Washington, D. C., for publications of the Department; to the directors of the State agricultural experiment stations, as listed on page 3 of the cover of this issue, for publications of the several experiment stations; and to publishers of books and journals for material issued by them. Microfilms and photostatic copies, the latter legible without magnifying equipment, may be purchased from the Library, U. S. Department of Agriculture, Washington, D. C. Rates and other details are explained in a previous issue (E. S. R., 87, p. 324).

Preparation of samples for microbiological determination of riboflavin, F. M. Strong and L. E. Carpenter. (Wis. Expt. Sta.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 909–913, illus. 3*).—The work of Bauernfeind et al. (E. S. R., 88, p. 734) having suggested that certain fat-soluble compounds are capable of stimulating the test organism *Lactobacillus casei*, a study was made of the effect on this organism of pure fatty acids, glycerides, and certain other organic compounds in an attempt to determine the cause of the high values obtained with cereals and cereal products assayed for riboflavin by the microbiological procedure of Snell and Strong (E. S. R., 82, p. 587). A comparative study was also made of the results obtained in the assay of cereal products by the Andrews procedure (E. S. R., 87, p. 621), the Scott procedure (E. S. R., 87, p. 11), and the Snell and Strong procedure used directly and also as modified to remove the interfering materials from the test solution, either by precipitation (accomplished by adjustment to pH 4.5 with 2.5 N sodium acetate) and filtration or by precipitation and filtration combined with ether extraction.

Cereal products assayed by the direct procedure showed a characteristic drift in values that indicated both stimulation and inhibition of the bacterial response; the stimulating material was apparently not removed by the Scott procedure, but the Andrews procedure and the modified Snell and Strong procedures resulted in satisfactory assay values. These results, together with the stimulatory effect exerted by an ether extract of hydrolyzed cornstarch, indicated the ether-soluble nature of the interfering material. The assay of different mixtures of pure riboflavin with various fatty acids showed that the effect on bacterial response depended both upon the absolute and the relative amounts of the riboflavin and the fatty acids. The widest deviations from 100 percent recovery were obtained with the lowest level of riboflavin tested (0.05 percent). Oleic and stearic acids markedly stimulated the bacterial response, while palmitic and especially linoleic acids acted as potent inhibitors. Neutral fats had little effect, and lecithin gave moderate stimulation at high levels. The procedure worked out for preliminary treatment of the sample for assay by the Snell and Strong method involved hydrolysis (autoclaving for 15 min. at 15 lb. pressure in 0.1 N HCl), followed by the precipitation and filtration procedure applied to the hydrolyzate. Thus modified, the method gave reliable values for riboflavin in cereals and mixed diets previously difficult to assay by the microbiological method.

Ascorbic acid: Rapid determination in fresh, frozen, or dehydrated fruits and vegetables, H. J. Loeffler and J. D. Ponting. (U. S. D. A.). (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 11, pp. 846–849, illus. 1*).—The authors find that ascorbic acid can be determined quickly in fruits and vegetables, whether fresh, frozen, or dehydrated, by disintegrating the sample with dilute metaphosphoric acid in a high-speed cutter and measuring the decolorizing effect of the extracted ascorbic acid on indophenol dye with a photoelectric colorimeter. This represents a combination of Morell's technic of preparing plant extracts (E. S. R., 87, p. 15) with a modification of the Evelyn colorimetric method for determining ascorbic acid. The ascorbic acid is distributed within the total liquid phase present, which includes the water and dissolved solids originally in the sample. Hence by using a large proportion of extractant and knowing the approximate amount of liquid in the sample, the ascorbic acid can be determined from as little as 3 cc. of filtrate after only one extraction. By using a large amount of 1 percent metaphosphoric acid as the extractant the buffering step is avoided, since the pH obtained is sufficiently low to prevent losses during blending, yet sufficiently high to prevent fading of the dye reagent. Rapid ascorbic acid determinations can be made easily on highly pigmented berries and tough dehydrated vegetables.

Aconitic acid, calcium, and magnesium aconitates in sorgo and sugar cane products, H. A. Cook (*Hawaii. Planters' Rec. [Hawaii. Sugar Planters' Sta.], 47 (1943), No. 2, pp. 71–73*).—Aconitic acid, its salts and derivatives have a commercial interest and value in the manufacture of plastics and plasticizers and they have been mentioned as having a bearing on some of the difficulties experienced from time to time in pan work and in the subsequent centrifugal separation of sugar crystals in sugar manufacture. A review of the available information on the subject is presented.

The production of sorgo sirup and sugar, H. A. Cook (*Hawaii. Planters' Rec. [Hawaii. Sugar Planters' Sta.], 47 (1943), No. 2, pp. 89–95*).—A review of work on processes for crystallizing sucrose from sorgo juices and for the preparation of sirups is presented.

Notes on the manufacture of cane sugar syrups, invert sugar syrup, candy, and similar products (*Hawaii. Planters' Rec. [Hawaii. Sugar Planters' Sta.], 47 (1943), No. 2, pp. 97–112*).—This article indicates that it should be possible to meet most, if not all, of this Territory's demand with local sugar and other products and thereby increase profits as well as reduce shipping space requirements between Hawaii and the mainland under war conditions. A discussion of the possibilities of manufacturing these products locally is presented.

Production of Spanish-type green olives, R. H. Vaughn, H. C. Douglas, and J. R. Gilliland (*California Sta. Bul. 678 (1943), pp. 82, illus. 18*).—Following an account of the industry in Spain and its history in California, the pickling processes used in California are described and investigations reported on the bacteriological and chemical changes occurring during fermentation and the acceleration of fermentation by incubation. Procedures for laboratory control are set forth, as well as recommendations for the general improvement of the industry. Analyses for oil content and other constituents of California and imported pickled green olives are included.

The important floral changes occurring in the brines of fermenting olives were found to be similar to those reported for the fermentation of sauerkraut by Pederson (E. S. R., 64, p 414). In fermentations of the Sevillano variety, the important species of lactic acid bacteria were found to be *Leuconostoc mesenteroides*, which dominates the latter stage of the primary fermentation as well as the early phases of the intermediate stage; *Lactobacillus plantarum*, which dominates the latter phases of the intermediate stage as well as the final stage; *L. brevis*, found in the latter phases of the intermediate as well as in the final stage; and *L. buchneri* and *L. fermenti*, which were encountered infrequently. The salt concentration of the brines had a marked effect on the total numbers and types of bacteria, and the fermentations of the Manzanillo variety, with which more salt is used, were markedly different, the heterofermentative types of *Lactobacillus* never being recovered.

Optimum temperatures for acid production from glucose by the lactic acid bacteria were found to range in *Leuconostoc mesenteroides* between 19° and 30° C., and in *Lactobacillus plantarum* and *L. brevis* between 30° and 37° For the most common spoilage bacteria the range was 30° to 40°. It was found that supplementary fermentable material may be added with assurance only when the undesirable bacteria have been eliminated. "Stuck" fermentations, which commonly occur with Manzanillo olives, and in which repeated additions of sugar are depleted without significant increase in acid production, were found to have been caused by yeasts. The control of the fermentations by the use of pure culture starters was found most successful with Sevillano fermentations, but satisfactory with Manzanillo olives in the majority of experiments. It is pointed out, however, that a number of factors significantly influence the acceleration of fermentation by the use of starters, and that inoculation alone is frequently not sufficient.

Acidification of the brines to control the fermentation was found unnecessary under ordinary conditions and is recommended only as a last resort. In this case 100-gr. vinegar or 50 percent edible lactic acid should be used.

Various abnormalities resulting from microbial decomposition are discussed.

The granulation test for measuring the degree of particle fineness in wheat meal, W. W. Worzella and G. H. Cutler (*Indiana Sta. Cir. 284 (1943), pp. 8, illus. 6*).—A simple test for accurately estimating granulation used satisfactorily by the authors in more than 8,000 tests, mostly of soft and semihard winter wheats, is described. The limitations and interpretations of the test are also discussed.

AGRICULTURAL METEOROLOGY

Use of condition reports and weather data in forecasting the yield per acre of wheat, F. H. Sanderson (*U. S. Dept. Agr., Bur. Agr. Econ., 1942, pp. 41, illus. 30*).—The importance of forecasts of crop production is increased during critical times. The formulas for improving them developed through this study are believed to point the way to increasing precision in the monthly crop reports of the Department. The study was originally undertaken as part of a general project of research in crop-estimating methodology, and this report is presented as a preliminary survey dealing with the Canadian Provinces contiguous to the Dakotas, Minnesota, and Montana and based on condition reports and weather data issued by the Canadian Government Similar analyses are compiled for the four States above named. The study covers the 17-yr. period 1921-37. The point is stressed that the formulas offered are average relationships, liable to breaking down if special circumstances prevail. Used as a basis of forecasting wheat yields in Saskatchewan and Alberta, 1938-40, it appeared that except for 1940 in the former Province the errors were well within the range of errors of estimate during the period covered by the analysis: In Alberta, of 22 forecasts 11 do not exceed the standard error of estimate and none exceeds twice the standard error. In Saskatchewan, of 18 forecasts made for 1938-39, 11 do not exceed the standard error of estimate and only one is in excess of twice the standard error; of 9 forecasts in 1940, however, 6 are in excess of twice the standard error. It is concluded that the official condition reports, based on crop reporters' returns, as issued by the Canadian Government as of June 30 and July 21, may be used as a basis for forecasting yield and production of wheat in the Prairie Provinces, except for Manitoba, where only the July 21 condition exhibits a sufficiently high correlation with final yield. It is believed that these condition reports would be significantly improved by allowing for variations in subsoil moisture (as represented by preseasonal precipitation) and for weather conditions during the period immediately preceding the report. The method developed is said to be applicable to crops other than wheat.

Solar relations to weather and life, I and Sup., II, H. H. Clayton (*Canton, Mass.: Clayton Weather Serv., 1943, vols. 1, pp. 105+, illus. 63, Sup., pp. 10+, illus. 4; 2, pp. 439+, illus. 231*).—Volume 1, discussing the yearly and daily cycles, solar variability and weather, solar cycles and weather cycles, forecasting the weather, solar cycles and life cycles, and the hypothesis of the planetary cause of sunspots, is in itself a summary of the detailed researches presented in volume 2, which consists mostly of reprints covering studies by the author extending over many years.

Monthly weather Review, [March and April 1943] (*Mo. Weather Rev. [U. S.], 71 (1943), Nos. 3, pp. 29–45, illus. 9; 4, pp. 47–64, illus. 8*).—In addition to meteorological, climatological, solar radiation, and sunspot data, these numbers contain the following contributions: No. 3, The Remarkable Temperature Fluctuations in the Black Hills Region, January 1943, by R. R. Hamann (pp. 29–32); and No. 4, Spectral Distribution of Illumination From a Clear Sky on a Horizontal Surface, by G. A. Tikhov (pp. 47–48), and North Atlantic Hurricanes and Tropical Disturbances of 1942, by H. C. Sumner (pp. 49–52).

[Meteorological data] (*Georgia Coastal Plain Sta. Bul. 35 (1942), pp. 13–14*).—Tabulated data are presented on rainfall, temperature, and frosts.

SOILS—FERTILIZERS

Fundamentals of soil science, C. E. Millar and L. M. Turk (*New York: John Wiley and Sons; London: Chapman and Hall, [1943], pp. 462+, illus. 78*).—A comprehensive textbook covering the general principles of soil science. The factors involved in fundamental soil properties are presented in simple terms which will extend the usefulness of the book to farmers and others. The 19 chapters of the book cover the following subjects: Soil development, classification of soils, physical and chemical properties of soils, soil reaction, lime and its use, soil moisture, soil organisms—their relation to soils and soil productivity, soil organic matter, cover and green manure crops, farm manures, nutrient requirement of plants, fertilizers and fertilizer materials, fertilizer practices, soil fertility maintenance and productivity rating of soil, soils and agriculture of arid regions, irrigation, fruit soils, lawn soils, and soil resources. A glossary of soil science terms is a feature of the book.

The nature and properties of soils, T. L. Lyon and H. O. Buckman, rev. by H. O. Buckman (*New York: Macmillan Co., 1943, 4. ed., rev., pp. 499+, illus. 58*).—This fourth edition takes into account the advancements made in soil science since the last revision in 1937 (E. S. R., 77, p. 587). Physics and chemistry applied to soils in connection with the physics of soil moisture and chemistry of the colloidal state are given special consideration in line with the progress on these problems. Because of its clear presentation and comprehensive coverage of the fundamentals of soil science, this volume continues to serve the needs of college instruction in soils and as a reference book.

Theoretical soil mechanics, K. Terzaghi (*New York: John Wiley and Sons; London: Chapman and Hall, [1943], pp. 510+, illus. 152*).—A textbook of soil mechanics treating only the theoretical principles. The author points out, however, that knowledge of theory must be combined with a knowledge of the physical properties of real soils and the difference between the behavior of soils in the laboratory and in the field, and in order to discuss this phase he plans to prepare another book. The 19 chapters are divided into 4 sections covering general principles involved in the theories of soil mechanics, conditions for shear failure in ideal soils, mechanical interaction between solid and water in soils, and elasticity problems of soil mechanics.

The formation, distribution, and engineering characteristics of soils, D. J. Belcher, L. E. Gregg, and K. B. Woods (*Purdue Engin. Expt. Sta. Res. Ser. 87 (1943), pp. 389, illus. 233*).—This publication presents data on the engineering properties of pedological soils. Soil properties are correlated with performance of highways in relation to subgrade, embankment, and foundation. In many cases methods of improving poor or unsatisfactory soils are suggested.

Microscopic study of soils from five great soil groups, J. R. Johnston and J. B. Peterson. (Iowa Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 360–367, illus. 5*).—This article reports a detailed microscopic description of Fayette silt loam, a Gray-Brown Podzolic soil: Norfolk loam, a Yellow Podzolic; Shelby silty clay loam, a Planosol; Barnes clay loam, a Chernozem; and Houston clay, a Rendzina soil, as revealed in thin sections observed under a petrographic microscope.

Mineralogical and chemical studies of soil formation from acid and basic igneous rocks in Missouri, R. P. Humbert and C. E. Marshall (*Missouri Sta. Res. Bul. 359 (1943), pp. 60, illus. 49*).—This study is essentially a comparison of the processes of rock break-down and soil formation as found on the granite porphyry, the acid igneous rock, and the diabase, the basic igneous rock. The mineralogical changes were followed by microscopic examination of thin sections of the rocks in various stages of decomposition and of fractions obtained in the mechanical analysis of the residual soils. Secondary products which remained in the soil profile were characterized by the electron microscope which proved useful in this work. Chemical determinations have been carried out on various horizons of the soil profile to provide information needed in comparing these soils with those of other regions.

[Soil Survey Reports, 1934, 1937, and 1938 Series] (*U. S. Dept. Agr., Bur. Plant Indus. [Soil Survey Rpts.] Ser. 1934, No. 23, pp. 95+, illus. 8; 1937, No. 7, pp. 54+, illus. 7; 1938, Nos. 3, pp. 72+, illus. 5; 4, pp. 67+, illus. 5*).—These surveys were made in cooperation with the State experiment stations as respectively noted: 1934, No. 23, Knox County, Ind., H. P. Ulrich et al. (Ind. Expt. Sta.); 1937, No. 7, Pickens County, S. C., A. E. Shearin et al. (S. C. Sta.); 1938, No. 3, Providence County, R. I., A. E. Shearin et al. (R. I. Sta.); and No. 4, Dimmit County, Tex., H. M. Smith and J. W. Huckabee, Jr. (Tex. Sta.).

The agriculture, soils, geology, and topography of the Blacklands Experimental Watershed, Waco, Texas. (Coop. Tex. Expt. Sta.). (*U. S. Dept. Agr., Hydrol. Bul. 5 (1942), pp. 38+, illus. 56*).—A detailed account of the factors listed in the title is presented to assist in planning watershed-improvement programs, with a view toward conservation of soil, reduction of floods, the better use of water resources, and the attainment of a balanced agricultural economy.

Exchangeable bases of solonchak of the Red River Valley, C. O. Rost and P. C. Chang. (Minn. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 354–359*).—Characteristics of soil samples from five profiles of solonchak studied suggest an explanation of changes involved in their desalinization which may, under certain conditions, lead to the formation of solonetz or under others to the elimination of this stage entirely. The soils developed under conditions of poor natural drainage and a relatively high water table. Soluble salts move upward and accumulate at or near the surface as water evaporates.

Chemical characteristics of some soils with diverse types of carbonate horizons and of associated normal soils, W. H. Metzger. (Kans. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 351–353*).—Laboratory studies of a basin soil profile from the Prairie area and one from the Chestnut area were undertaken to aid in the matter of correlation of these soils, since a considerable degree of similarity in appearance of the profiles suggested placing them in the same soil series. Chemical analyses showed definite indications of podzolization in the soil from the Prairie area but no such indication for the basin soil of the Chestnut area. The data for the basin soil from the Prairie area were similar in general nature to those of the normal soil of that area, while a similarity of like extent was apparent for the data from similarly selected profiles of the Chestnut area. The author concludes that the two basin soils should not be correlated in the same soil series.

The nature of two associated Wisconsin soils as influenced by postglacial erosion, topography, and substratum, L. B. Nelson. (Wis. Expt. Sta.). (*Wis. Acad. Sci., Arts, and Letters, Trans., 34 (1942), pp. 63–72, illus. 2*).—Results of detailed field study are presented on differences in profile characteristics and crop relationships for two major agricultural soils of north-central Wisconsin. The soils studied were Marathon and Spencer silt loams.

Aggregation of an orchard and a vegetable soil under different cultural treatments, L. Havis (*Ohio Sta. Bul. 640 (1943), pp. 28+, illus. 6*).—Physical condition of orchard and garden soils is considered in relation to productive capacity. The effect of long-time soil management practices on aggregation was determined for Wooster silt loam used for orchards and on both Chenango loam and fine sandy loam soils used for vegetable production. Water-stable aggregates in the A and B horizons of Wooster silt loam were determined by the wet screen method on air-dry soil.

Amounts of aggregates of various sizes obtained by this method were strikingly different under the sod, mulch, and cultivation treatments. The mulch showed the greatest amount of aggregates among the larger sizes, sod resulted in almost as much aggregation, and the cultivated soil contained only small aggregates. Results of aggregate analysis of several soil treatments which had been in progress 7 yr. showed that the state of aggregation was in fairly close relationship to the percentage of soil organic matter, except for the high aggregate formation under wheat straw mulch. Soil aggregation was found to be limited, even under heavy manure treatments in terrace soils such as the Chenango loam and fine sandy loam. It was possible to increase the state of aggregation slightly, however, by annual applications of manure.

Soil erosion and its control, L. G. Jones and L. M. Thompson (*College Station: Tex. A. and M. Col., 1941, pp. 283, illus. 129*).—A revision of a book by the same authors entitled Soil Erosion and Its Control in the Southwest. This book is organized to fit the course in soil conservation taught in the agronomy department of the Agricultural and Mechanical College of Texas. Major emphasis is devoted to physical factors influencing erosion and methods of erosion control.

Soybeans and soil conservation, D. D. Smith. (Coop. U. S. D. A.). (*Missouri Sta. Bul. 469 (1943), pp. 16, illus. 8*).—Fertilizer practices that have been found to give the largest yields of soybeans are discussed. The growing of soybeans has been found to make the soil particularly subject to erosion losses unless certain management practices are followed. Management systems that have been found to result in high yields and also keep erosion under control are presented. Under sloping field conditions, terraces and contour tillage are necessary for rotations involving soybeans. The author especially points out that on sloping land soybeans should not be used in addition to corn but in place of it. Contour tillage with grassed waterways or buffer strip-cropping with grassed waterways is recommended as a practical supporting practice on land with short slope and of irregular topography.

The effects of rye, lespedeza, and cowpeas when used as cover crops and incorporated with the soil on the leachings from Dunmore silt loam soil, H. H. Hill (*Virginia Sta. Tech. Bul. 83 (1943), pp. 16*).—These effects were determined for an 8-yr. period through the use of lysimeters. The different organic materials resulted in a marked reduction of the leachate. Incorporation of rye, lespedeza, and cowpeas with the soil conserved the calcium carbonate. This was also true when the entire crop had been removed from the soil, leaving only the stubble, when compared with the amount of calcium carbonate found in the leachings from the control soil, which had been allowed to remain in a fallow condition. Magnesium carbonate of the soil was also conserved by the organic matter treatments. Losses of total bases of calcium and magnesium calculated as calcium carbonate were also reduced by the treatments. Additions of organic matter increased the leaching of sulfur from the soil. A conservation of potassium was shown throughout the entire period of the investigation. The nitrate nitrogen which leached from the control soil that had been left in a fallow condition was much greater in amount than the nitrate nitrogen found in the leachings from the soils seeded to cover crops, which in turn were incorporated with the soil. When crops of rye and cowpeas and of rye alone used as a winter cover were removed from the soil leaving only the stubble, the outgo of nitrate nitrogen was not as great as the outgo from the control soil. Annual chemical analyses of the soil from the different treatments revealed that the turning under of cover crops had a marked effect on the nitrogen accumulation of the soil.

The effect of different oxygen concentrations on the rate of respiration of Azotobacter in relation to the energy involved in nitrogen fixation and assimilation, J. M. Fife. (Calif. Expt. Sta.). (*Jour. Agr. Res.* [*U. S.*], *66 (1943), No. 12, pp. 421–440, illus. 7*).—The author studied rate of respiration of *Azotobacter* during nitrogen fixation and while the organism was assimilating the ammonium and the nitrate ions over the entire range of partial pressure of O_2 up to 1 atmosphere. The rate of respiration was found to be dependent on the O_2 concentration provided the CO_2 in the culture was maintained at a low level and the medium kept saturated with O_2 at the partial pressure in question. Below 2 percent O_2, while fixing nitrogen, *Azotobacter* showed a respiratory quotient well above unity. At 0.1 percent O_2 the value reached 3.00. At all concentrations of O_2 above 2 percent the heat measured was found to be equal to that calculated from the CO_2 evolved except at 78 percent O_2. At this concentration the heat measured was found to be approximately 57 percent of that calculated from the CO_2 evolved. When *Azotobacter* was assimilating the ammonium ion the rate of respiration was found to be almost directly proportional to the concentration of O_2 from 5 to 80 percent. The heat measured was found to be equal, at all concentrations above 5 percent, to that calculated from the CO_2 evolved. Below 5 percent the R. Q. was found also to increase as the concentration of O_2 decreased until at 0.1 percent O_2 the R. Q. reached 3.54. The rate of respiration was found to be directly proportional to the O_2 concentration from 10 to 100 percent O_2 when *Azotobacter* was allowed to assimilate the nitrate ion. Below 10 percent O_2 intramolecular respiration occurred to a considerable extent. The R. Q. reached 5.0 at 1 percent O_2.

Plant tissue tests versus soil tests for determining the availability of nutrients for tobacco, G. M. Shear (*Virginia Sta. Tech. Bul. 84 (1943), pp. 12*).—The results of 4 years' tests for nitrates, phosphorus, and potash in soil extract and conductive tissue of flue-cured tobacco, grown under a wide range of fertilizer treatments, indicated that as a basis for making recommendations for supplemental applications of fertilizer in cases of moderate to severe nutrient deficiencies in tobacco, analysis of conductive tissue extract is more reliable than that of soil samples. A deficiency of N when P and K were available in adequate quantities resulted in low nitrate N and high P in the conductive tissue extract. A deficiency of P when N and K were available in adequate amounts resulted in low P in the conductive tissue extract but did not affect the amount of nitrates and potash. A deficiency of K when N and P were available in adequate amounts resulted in a low amount of potash but a high amount of nitrate and P in the conductive tissue extract.

Factors affecting the availability of potassium in soils of the lower Mississippi deltas, W. E. Worsham and M. B. Sturgis. (La. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 342–347, illus. 1*).—Representative soils of the lower Mississippi deltas were investigated to determine the relationships of soil characteristics, decomposition of organic matter, presence of calcium salts, variations in soluble potassium, and high moisture content on availability and fixation of potassium. A wide variation in the availability of the native potassium in the soils was found to exist. In general a high available potassium content was associated with a high base exchange capacity. Exceptions occurred in soils that were completely base saturated. Calcium salts added to a 100-percent base-saturated soil liberated potassium. Organic matter markedly increased the available potassium in the soils and also increased the outgo of potassium in the leachate. A high potassium outgo was found to accompany a high calcium outgo. In artificially base-saturated and unsaturated soils, the amount of potassium fixed was found to be a function of the soluble potassium in the soil system. Saturating the soils with moisture markedly increased the available potassium.

Fixation and recovery of phosphate from some lateritic soils, F. Moser. (S. C. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 328–334, illus. 3*).—Pot studies on the fixation of soluble phosphates were conducted on Lloyd clay loam, Cecil sandy clay loam, and Orangeburg fine sandy loam soils by treating representative samples of each of these soils with monocalcium phosphate corresponding to applications of 20 percent superphosphate ranging from 500 to 16,000 lb. per acre. Fixation was determined by the amounts of weak acid-soluble phosphorus present in the soil at 3-, 6-, 9-, and 12-mo. intervals after the phosphate was applied. The greatest fixation occurred with the Lloyd clay loam.

The influence of certain soil treatments upon the fixation and availability of applied phosphates, O. L. Copeland and F. G. Merkle. (Pa. Expt. Sta.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 321–327, illus. 7*).—The effect of soil treatments over a period of years on the power of the soil to fix applied soluble phosphates was investigated. The influence of soil acidity, organic matter, and manure on phosphate fixation is given particular attention.

Adsorbed phosphates in soils and their relation to crop responses, R. H. Bray and S. R. Dickman. (Univ. Ill.). (*Soil Sci. Soc. Amer. Proc., 6 (1941), pp. 312–320*).—Methods of determining various adsorbed phosphate fractions are compared and the results correlated with yields and responses to added phosphates from rock and superphosphate. Crop growth and response for the soils and crops studied were found to be generally correlated with the relative amounts of all phosphorus fractions present and not with the amount in any one fraction. Addition of soluble phosphates to the soil increases all the adsorbed fractions.

Fluorine content of plants fertilized with phosphates and slags carrying fluorides, W. H. MacIntire, S. H. Winterberg, J. G. Thompson, and B. W. Hatcher. (Tenn. Expt. Sta. et al.). (*Indus. and Engin. Chem., 34 (1942), No. 12, pp. 1469–1479, illus. 5*).—The results obtained in the cultures of sweetclover, red clover, and Sudan grass are said to warrant the following conclusions: "(1) No toxic effect upon either germination or plant growth will be induced by the component fluorides of superphosphates used judiciously in relation to need for liming. (2) No enhancement in the fluorine content of forage crops is to be expected from the conventional use of fluoride-bearing fertilizers and liming materials. (3) Fluorides introduced by the substitution of calcium silicate slags for other liming materials cause no deleterious effects upon either germination or plant growth. (4) A mixing of concentrated superphosphates with adequate proportions of liming materials before incorporation precludes any harmful fluoride effect upon either germination or plant growth. (5) Highly abnormal proportions of calcium fluoride in the soil exert no directly injurious effect upon either germination or plant growth and induce no appreciable increase in the fluorine content of the above-ground growth of forage crops. (6) No toxic effect upon plant growth and no enhancement in fluorine content would result as a delayed effect of accumulations of fluorides from the long-continued use of fluoride-carrying phosphatic fertilizers and slags. (7) Calcium fluoride can be considered as the form to which additive fluorine compounds pass after incorporation with soils of humid regions. (8) No deleterious effect is to be expected when livestock is fed forage crops grown on soils fertilized with superphosphates and calcium silicate slag from rock phosphate reduction furnaces."

Twenty-seven references to the literature cited are included.

Manure, a wartime fertilizer, E. H. Tyner (*West Virginia Sta. Cir. WS 13 (1943), pp.* [8], *illus. 6*).—The composition, value, and importance of proper methods of conservation and application are discussed. Crops to be fertilized with manure and the value of adding phosphates are also considered.

Artificial manures, A. B. Beaumont (*New York: Orange Judd Pub. Co., 1943, pp. 155+, illus. 40*).—A textbook presenting in a practical manner systems of utilizing various organic materials for soil improvement and plant growth. The publication is well illustrated and offers many timely pointers on possible organic materials and methods of treatment so as to make them of the greatest value for increased crop production during the emergency period of limited inorganic fertilizer supplies. The importance of organic matter in soil conservation is given special emphasis.

Duff briquette fertilizers: Their preparation, use, and effect upon the growth of trees and other plants, S. A. Wilde and R. Wittenkamp. (Wis. Expt. Sta. et al.). (*Jour. Amer. Soc. Agron., 34 (1942), No. 8, pp. 736–746, illus. 4*).—The main features of the briquette fertilizer practice as carried on in Wisconsin are presented. Briquettes are made of a mixture of hardwood-hemlock duff, lacustrine clay, and fertilizer salts, and the finished briquettes contain 0.1 gm. of total fertilizer salts per cubic centimeter and have an N–P–K ratio approaching 4:3:5. In a comparison of placement of briquettes involving planting in holes, in slits, and as top dressing the latter method was successful only with rapidly growing garden crops. Briquettes were used chiefly in the fertilization of plants in public parks, camping grounds, nurseries, gardens, landscape plantings, and roadside shelterbelts. With some exceptions, the results obtained from their application were greatly superior to those obtained with an application of ordinary mineral fertilizers.

AGRICULTURAL BOTANY

Laboratory manual on fundamental principles of bacteriology, A. J. SALLE (*New York and London: McGraw-Hill Book Co., 1943, 2. ed.,* [*rev.*], *pp. 184+, illus. 4*).—Although this revision of the manual composed largely of material incorporated in the first edition of the author's book on fundamental principles of bacteriology (E. S. R., 81, p. 19) can be used in connection with any satisfactory textbook, it is written especially to accompany the second edition of his book (E. S. R., 89, p. 290).

An introduction to industrial mycology, G. SMITH (*London: Edward Arnold & Co.,* [*1942*], *2 ed., pp. 260+, illus. 136.*)—A revision of the textbook previously noted (E. S. R., 81, p. 19), with a foreword by H. Raistrick.

Conserving names of fungi, C. L. SHEAR. (U. S. D. A.). (*Mycologia, 35* (*1943*), *No. 3, pp. 267–271*).—This is a plea for the conservation of fungus names by a simple method of selecting types which will fix them in accord with the best present usage, whether they were first proposed by this or that author. Instead of so much stress on dates and priority, it is considered that a much simpler and more rational plan of attaining the desired result in conserving generic names would be first to determine what names should be conserved and what species should be selected as their types, in order to bring most of the species now generally included under a particular name together. The present confusion in the genus *Corticium* is discussed as an example of what not to do. "Why worry so much about who shall be given credit or discredit for having proposed a generic name, as in most cases of the older genera no single author really defined the genus according to its present concept, and its final definition, if ever agreed upon, will probably involve the work of yet unborn mycologists?"

The spermodochidium, an unusual type of spermatial fruit-body in the Ascomycetes, H. H. WHETZEL. (Cornell Univ.). (*Mycologia, 35* (*1943*), *No. 3, pp. 335–338*).

Standardized plant names: A list of standard common names for the more important Australian grasses, other pasture plants, and weeds (*Austral. Council Sci. and Indus. Res. Bul. 156* (*1942*), *pp. 99*).

The useful plants of the world, W. N. CLUTE (*Indianapolis, Ind.: Willard N. Clute & Co., 1943, 3. ed., pp. 219+*).—The chief object in preparing this book was "to give the common, technical, and family names of the useful species with such other information regarding them as may prove of interest to the general reader, and at the same time make it possible for the student to pursue further the subject in other books."

Emergency food plants and poisonous plants of the islands of the Pacific, E. D. MERRILL (*War Dept.* [*U. S.*], *Tech. Man. No. 10–420* (*1943*), *pp. 149+, illus. 113*).—"The purpose of this manual is to aid the individual who becomes separated from his unit by illustrating and describing the edible and poisonous plants so that this individual can live off the land."

A textbook of general botany, G. M. SMITH, E. M. GILBERT, R. I. EVANS, B. M. DUGGAR, G. S. BRYAN, and C. E. ALLEN (*New York: Macmillan Co., 1942, 4. ed.,* [*rev.*], *pp. 668+, illus. 460*).—Though the general plan of the book (E. S. R., 60, p. 388) has not been altered in this edition, various changes in arrangement of material have been made. The chapter on Myxomycetes, omitted from the third edition, has been restored, new chapters have been added on plant diseases and fossil plants, and data resulting from more recent studies have been incorporated.

Nociones de botanica: Curso experimental para uso de las escuelas secundarias, normales, y preparatorias [Botanical contributions: Progress

in research for use of secondary, normal, and preparatory schools], I. E. Motts (*México: Sec. Ed. Pub., 1943, 11. ed., pp. 388+, illus. 276*).—Part 1 (pp. 3–207) deals largely with plant organs (the seed, plant cell, root, stem, leaf, flower, and fruit), and part 2 (pp. 209–356) with classification of representative forms from the bacteria and Myxomycetes through the higher plants. A glossary and a subject index are provided.

A handbook of the vascular plants of northeastern Nevada, A. H. Holmgren (*U. S. Dept. Int., Grazing Serv., and Utah Agr. Col., 1942, pp. 214+*).—This handbook was prepared under the direction of the Intermountain Herbarium of the Utah College, primarily as an aid to the field identification of range forage plants by those without formal botanical training, and includes brief statements concerning the abundance, habitats, distribution, and economic importance of the plants included. Almost 6,000 collections over five summers constitute the primary basis on which the check list was made, and nearly 50 records apparently new for the area are included. Numerous keys and an index to genera and to common names are provided.

The vegetation of Idaho, R. M. Myers (*Jour. Sci. Labs. Denison Univ., 38 (1943), Art. 2, pp. 32–39, illus. 1*).—Eight plant associations are given for the area, and the distribution, climate, elevation, and principal plant species of each are listed. The bunchgrass has been largely destroyed by overgrazing and has been replaced by sagebrush. The latter type, which occupies the southern part and more than half of the area of the State, is discussed in some detail and a comparison drawn between its original and present conditions. The piñon-juniper and salt desert shrub associations have also been changed by grazing.

Vegetation of the northern part of Cherry County, Nebraska, W. L. Tolstead. (Univ. Nebr.). (*Ecol. Monog., 12 (1942), No. 3, pp. 255–292, illus. 35*).—Agricultural practices in the North American Great Plains area are now in the process of adjustment from a traditional agriculture initiated by pioneer farmers to a grazing economy based on the potentialities of climate and land. Attainment of a proper system of land use has been retarded in many localities by lack of definite information on the vegetation and its indicator significance. In this study of the vegetation of a north-central county of Nebraska, over 90 percent of which lies in the sand-hill region, the interrelations between the plants and their environments are discussed, the dominant species are described, and changes in grasslands due to seasons, grazing, and climatic cycles are explained.

Land use and plant succession in Coon Valley, Wisconsin, J. B. Marks (*Ecol. Monog., 12 (1942), No. 2, pp. 113–133, illus. 8*).—As far back as historical time can be traced, men have been living in this area under different systems of agriculture and landownership, and under different societies, but always they have lived from the land and within a framework of natural vegetation. In this study the author has attempted to determine just what effects these various peoples, societies, and land systems have had on the direction and end of plant succession within the area. In the first period Indians used repeated ground fires in their hunting economy. The first white settlers stopped the Indian fires and set up a new exploitive land use of their own. The arrival of the U. S. D. A. Soil Conservation Service in the valley was the beginning of a new land use which is even yet only developing. The regional succession seems to be prairie, to brush, to xeric oak woods, to red oak woods, to maple-basswood woods, but it is not at all certain that this succession will go to completion on all sites. Evaporation readings indicate that this succession tends toward moister conditions. The maple-basswood woods are more shaded and their soil is more nearly neutral than that of the red oak type.

The bogs of northern lower Michigan, F. C. Gates. (Kans. State Col. et al.). (*Ecol. Monog., 12 (1942), No. 3, pp. 213–254, illus. 32*).—This study, reported in detail, is based on work conducted during the past 30 yr. in the Douglas Lake region, located in the northern part of the overlapping zone between the northeastern coniferous and the central deciduous forest provinces in the extreme northern part of the Lower Peninsula of Michigan. Although bogs reclaimed by drainage are suitable for agricultural use, in this region they are more valuable as water reservoirs and as both shelter and feeding ground for wildlife.

A simple assembly for use in the testing of cultures of Rhizobia, L. T. Leonard. (U. S. D. A.) (*Jour. Bact., 45 (1943), No. 6, pp. 523–527, illus. 1*).—The method and apparatus described for testing *Rhizobium* cultures depend on the self-irrigation of disinfected sand mixtures through capillary action, with solutions so acid as to preclude the survival of any of the common nodule bacteria. This protective acid nutrient is neutralized when in contact with the Ca in the sand, and carried further into the mixture makes a favorable artificial substrate for the growing of some plants under controlled conditions.

Present status of plant hormones, P. W. Zimmerman (*Indus. and Engin. Chem., 35 (1943), No. 5, pp. 596–601, illus. 5; also Boyce Thompson Inst. Plant Res., Prof. Paper, 1 (1943), No. 35, pp. 307–320+, illus. 5*).

Growth of orchid seeds after dehydration from the frozen state, R. D. Svihla and E. Osterman (*Science*, 98 *(1943), No. 2531, pp. 23–24*).—The authors report the survival and growth of orchid seeds when vacuum dried after freezing at low temperatures. The seeds used were from crosses between two species of *Cattleya* and between *Laelia* and *Cattleya*. Similarly treated seeds of tuberous begonia and snapdragon failed to survive.

The synthesis of sucrose in the sugar cane plant, I, C. E. Hartt (*Hawaii. Planters' Rec. [Hawaii. Sugar Planters' Sta.], 47 (1943), No. 2, pp. 113–132, illus. 5*).—The formation of sucrose from glucose was found to occur in detached blades, sheaths, stems, and roots, and sucrose synthesis could also take place in entire stalks. More sucrose accumulated in the stems of entire stalks with leaves attached than in excised cane with leaves removed, indicating that both synthesis in situ and translocation from the leaf may be involved in sucrose storage in the stem. When entire plants were placed in glucose solutions the roots absorbed glucose and accumulated sucrose, but in the above-ground parts only the stems gained a little sucrose. The formation of sucrose from glucose or fructose occurs in darkness without requiring chlorophyll and thus is a process distinct from photosynthesis. Blades from different levels on the stem differed in their ability to make sucrose from glucose, and the same difference was shown when blades stored sucrose as a result of photosynthesis, suggesting that its synthesis takes place by the same mechanism whether the glucose is supplied artificially or through photosynthesis. In hourly studies of blades supplied with glucose or fructose, the percentages of sucrose increased much more than for the reducing sugars. Some component of the mechanism for converting glucose to fructose and forming sucrose appears to be less active in blades detached from plants at night than in those removed during the day. This component is active again in blades detached in the early morning before dawn.

Temperature affects the sugar absorption, glucose and fructose interconversion, and sucrose formation. Low temperature (6° C.) prevented interconversion and synthesis but not absorption, and synthesis was most efficient at 30°. Sucrose formation from glucose or fructose took place as well (or better) in albino as in green blades. Etiolated shoots supplied with glucose accumulated fructose and when supplied with fructose they accumulated glucose, but the sucrose production was lower in such shoots. Aeration proved essential both for glucose and fructose interconversion and for sucrose formation, and also increased the sugar absorption. The lower third of the blade was the most efficient in synthesis and the upper third in sugar absorption, whereas the middle portion was poorest in both. The laminae were more efficient than the midribs in sugar absorption, conversion of glucose to fructose, and in sucrose synthesis. Cutting the blades into pieces approximately 1 in. long failed to decrease synthesis, but grinding them stopped it completely, as well as inhibiting the conversion of glucose to fructose.

Some fundamental aspects of photosynthesis, J. Franck (In *Science in Progress, III*, edited by G. A. Baitsell. (*New Haven: Yale Univ. Press; London: Humphrey Milford, 1942, vol. 3, pp. 179–207, illus. 19*).—Some of the basic physical and chemical aspects of the subject are discussed.

Nucleoli in Agropyron repens Beauv., B. C. Sharman (*Nature* [*London*], *151* (*1943*), *No. 3823, p. 170, illus. 1*).—A report on the finding of six nucleoli (illustrated) in the shoot apex of quackgrass, with its implications.

Citrus roots: Their anatomy, osmotic pressure, and periodicity of growth, K. F. Cossmann (*Palestine Jour. Bot., 3* (*1940*), *No. 1–2, R Ser., pp. 65–104, illus. 11*).—Details of a study of the development and structure of the roots of nine species and varieties of citrus are presented. In seedlings of sweet lime, rough lemon, and sour orange, the osmotic value varied considerably with the variety and was inversely proportional to the moisture content of the soil. The varieties studied which had low osmotic values also exhibited early suberization of the endodermis and failed to do well on light soils. Regular observations on root growth, though as yet incomplete, tended to show that the factor limiting its intensity is correlated in moist winters with the soil temperature and in dry summers with soil moisture. There are 38 references.

GENETICS

Isolation by distance, S. Wright (*Genetics, 28* (*1943*), *No. 2, pp. 114–138, illus. 10*).—In further progress of the mathematical study of the effect of various factors on natural populations, attention is called to the fact that breeding may not be random since inbreeding between certain sections may be excluded by distance. Differences in environment may give rise to differential adaptation which may not be the same throughout the area. The variance of gene frequencies in different subdivisions is mathematically discussed for various sized populations with various degrees of isolation.

A comparison of the actual yield of double crosses of maize with their predicted yield from single crosses, H. K. Hayes, R. P. Murphy, and E. H. Rinke. (Minn. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35* (*1943*), *No. 1, pp. 60–65*).—Since 1938, the predicted yield and moisture content of double crosses has been obtained by averaging the performance of 4 of 6 single crosses possible between 4 inbred lines, not using in the average the 2 single-cross parents of a particular double cross. Comparison of yields and moisture contents of 114 such selected double crosses grown as a part of the regular program suggested that as a plant breeding technic the method of selection is highly reliable. Trials with five replications at four locations in the same season revealed excellent agreement between the predicted and actual performance of eight double crosses in yield and moisture content. See earlier notes (E. S. R., 84, pp. 26, 27).

Breeding behavior of C30, a diminutive P39 mutant whose hybrids show increased vigor, W. R. Singleton. (Conn. [New Haven] Expt. Sta.). (*Genetics, 28* (*1943*), *No. 1, p. 89*).—"Purdue 39, the most widely used sweet corn inbred, mutated to a semidwarf form, C30. This inbred is entirely normal and similar to Purdue 39 in every respect except smaller. The average height of all

P39 plants in 1942 was 72 in., while C30 plants were only 42 in. high. The ear size is similarly reduced. C30 × P39 shows complete dominance of the P39 growth habit. Such plants when selfed produce 25 percent of C30 type plants. The F_1 hybrid backcrossed to C30 produces 50 percent of each type, showing clearly a segregation due to a one-gene difference. When C30 and P39 are each crossed to a common inbred C13, the C30 × C13 crosses yield in some cases significantly more than the P39 × C13 hybrids. The difference is more pronounced when P39 and C30 are crossed by C15. Here seems to be a truly heterotic factor giving increased vigor in hybrids, although the inbred itself is much reduced in size."

Inheritance of oil glands in Pima cotton, R. H. PEEBLES and E. G. SMITH. (U. S. D. A.). (*Jour. Agr. Res.* [*U. S.*], *66* (*1943*), *No. 12*, *pp. 447–452*, *illus. 2*).—P Hope Pima cotton (E. S. R., 86, p. 763) is characterized by smooth boll surface and the three previously undescribed characters, i. e., delayed development of boll glands, small and deeply embedded stem glands, and small calyx glands PH8, a normal Pima, has the contrasting characters of pitted boll surface, early development of boll glands, large and shallowly embedded stem glands, and large calyx glands. Observations in segregating populations of PH8 × P Hope indicated that the characters mentioned above occur only in combinations existing in the parent families and in F_1 An instance of manifold expression of a single pair of genes rather than complete linkage is suggested. Ratios in F_2 and backcross populations agreed fairly well with expectations based on assumption of a single-factor difference. A remarkable increase in number of boll glands occurring in F_1 and also in the heterozygous class in F_2 and backcross populations is deemed a noteworthy manifestation of heterozygosity, explainable by assuming that B^p and B^s are complementary in respect to number of boll glands, either gene alone giving rise to only half the number of glands that appear when the two are brought together in the heterozygote.

The genetic system of banana varieties in relation to banana breeding, K. S. DODDS (*Empire Jour. Expt. Agr.*, *11* (*1943*), *No. 42*, *pp. 89–98*).—The wild species and a few of the edible varieties of banana are diploid with 22 chromosomes, the majority of the edible kinds are triploids with 33 chromosomes, and hybridization produced tetraploids, a few higher polyploids, and some aneuploids. Four factors—vegetative propagation, parthenocarpy, sterility, and polyploidy—are said to dominate the genetics of the banana complex. Each of these factors and their interdependence are discussed, and a possible breeding program for the improvement of the banana is outlined. The author suggests that by concentrating the present research on means of synthesizing a suitable diploid male parent for the production of primary tetraploids from the Gros Michel variety a commercially acceptable disease-resistant banana may be obtained, along with valuable genetic information.

Inheritance of seed color in Lactuca sativa, R. C. THOMPSON. (U. S. D. A.) (*Jour. Agr. Res.* [*U. S.*], *66* (*1943*), *No. 12*, *pp. 441–446*).—Horticultural varieties of lettuce may be roughly separated into three groups on the basis of seed color. An analysis of data from the F_1 generation and from F_2 and F_3 progenies of crosses involving the three seed colors suggested that the expression of seed color is controlled by two pairs of allelomorphs to which are assigned the symbols *Ww* and *Yy*. The presence of both factors in the dominant condition gave black seed. The presence of a dominant *Y* and a recessive *w* produced yellow seed. In the absence of a dominant *Y*, white seed were formed. None of the white-seeded varieties of lettuce on which breeding records are available were of the double recessive *wwyy* type, leading to the conclusion that this type must be very rare among horticultural varieties of lettuce.

Phänogenetik der Kaninchenfärbung [Phenogenectics of rabbit coloring], R. Danneel (*Ergeb. Biol., 18 (1941), pp. 55–87, illus. 22*).—A review of pigment production in the hair of the rabbit led to the classification of three types on which temperatures and genes were concerned: (1) The production of Golgi systems and lipochondria, (2) ferment production, and (3) pigment production. These factors are discussed as they occur in the hair from different regions of the hide of several kinds of rabbits.

A study of four generations of rats treated with large amounts of glutathione, T. R. Sherrod and H. C. Struck. (Univ. Ill.) (*Growth, 7 (1943), No. 1, pp. 11–15, illus. 1*).—Daily injections of rats when 21 days of age for four generations, even during pregnancy, with 25 mg. of glutathione had no influence on the weights of the progeny.

Inherited differences in the choline requirements of rats, R. W. Engel. (Ala. Expt. Sta.). (*Soc. Expt. Biol. and Med. Proc., 52 (1943), No. 4, pp. 281–282*).—The daily requirement for choline was nearly twice as great in 76 F_2 progeny of 2 male and 2 female rats as in 126 F_2 progeny from a like number of rats having lower choline requirements. With a daily intake of 4 mg. of choline, 100 percent of the males in the high-requirement strain developed kidney hemorrhage lesions within 2 weeks. The kidney lesions occurred in only 48 percent of the males in the low-choline-requirement strain. Similar results were obtained for females, except that their requirement was lower than that of males.

The genetics of the mouse, H. Grüneberg (*Cambridge, Eng.: Univ. Press, 1943, pp. 412+, illus. 92*).—An exhaustive account of known genetic characters in the mouse, with methods of inheritance, and frequent illustrations of mutations.

A test for genetic factors influencing abnormal segregation ratios in the house mouse, L. C. Dunn (*Genetics, 28 (1943), No. 2, pp. 187–192*).—In further study of the tailless condition in the house mouse (E. S. R. 89, p. 433), the male offspring of the variable male were found to give such variation in the tail condition of the progeny as to suggest that the situation was nongenetic. More than 5,000 individuals were included in the analysis.

On the physical basis for genetic resistance to mouse typhoid, Salmonella typhimurium, J. W. Gowen and M. L. Calhoun. (Iowa Expt. Sta.). (*Natl. Acad. Sci. Proc., 29 (1943), No. 5, pp. 144–149, illus. 1*).—In the course of establishing six strains of mice by inbreeding for resistance to mouse typhoid, variations in erythrocyte counts and leucocyte numbers, which were highly correlated with the degree of resistance, were also fixed in the different strains. The proportion of particular types of cells which make up the leucocytes were not fixed. The numbers of erythrocytes in the six strains were not so closely correlated with resistance. These results suggested that different environmental conditions may cause primary cell types to develop into different groups of leucocytes. Following a review of resistance to several diseases, it appears that the numbers of leucocytes in general, or the numbers of particular kinds of leucocytes, play a pronounced part in hereditary immunity.

Poultry breeding applied, F. A. Hays and G. T. Klein (*Mount Morris, Ill.: Poultry-Dairy Pub. Co., 1943, pp. 192, illus. 30*).—This book brings together known facts on the inheritance of characters in poultry and the linkage relations for them. The application of this knowledge to breeding operations is stressed. The inheritance of characters in breed improvement and crossing breeds is emphasized. The use of the more scientific methods for the newer approaches to improved egg production and meat qualities is described as are also the mechanics of pedigree breeding and the application of genetic principles to turkey production.

Occurrence of premature ovulation in the domestic fowl following administration of progesterone, R. M. Fraps and A. Dury. (U. S. D. A.). (*Soc.*

Expt. Biol. and Med. Proc., 52 (1943), No. 4, pp. 346–349).—Continuing studies of induced ovulation in the hen (E. S. R., 89, p. 48), it was found that crystalline progesterone administered subcutaneously or intravenously was highly effective in causing premature ovulation of normally developing follicles. The results with 417 hens were shown to differ with the route of injection, time from injection to expected normal ovulation, injection level, and place of the follicle in the clutch sequence. The first follicles were ovulated 6 hr. prematurely in 90 to 95 percent of those receiving 0.5 and 1 mg. of progesterone intravenously or 1 to 10 mg. subcutaneously. In from 70 to 75 percent of the cases, follicles other than the first in a clutch were ovulated at least 7 hr. prematurely by subcutaneous injection of 0.5 to 5 mg. Intravenous administration under these conditions was relatively ineffective. The intervals between injection and ovulation varied from 7 to 11 hr.

Differentiation in respiratory activity of isolated embryonic tissues, A. L. Romanoff. ([N. Y.] Cornell Expt. Sta. et al.). (*Jour. Expt. Zool., 93 (1943), No. 1, pp. 1–26, illus. 3*).—The cubic millimeters of oxygen consumed per hour per milligram of dry tissue for whole chick embryos of various ages and special tissues showed that the relative oxygen consumption decreased with embyronic development. There was a higher rate of oxygen consumption in the anterior than in the posterior region during the period of predominant neurogenetic development. This was reversed at the time of organogenetic development. The order for the oxygen consumption by the tissues stayed rather constant in the embryos of different ages.

Geographic variation of the pigeons of the genus Columba, R. W. Cumley. (Univ. Wis.). (*Auk, 60 (1943), No. 3, pp. 408–425, illus. 3*).—The species of the genus *Columba* inhabiting the warmer regions of the earth have a shorter average total length, wing length, tail length, and tarsal length than those inhabiting other regions. Evolution within the genus *Columba* appears, from the characteristics studied, to have proceeded primarily from the south to the north or vice versa, although there was some evidence of progressive differentiation from east to west.

Some factors affecting augmentation of pituitary gonadotropic extracts by heme, L. E. Casida, R. K. Meyer, and W. H. McShan. (Wis. Expt. Sta.). (*Amer. Jour. Physiol., 139 (1943), No. 1, pp. 89–94, illus. 1*).—Study by analysis of variance of the effect of different amounts of pituitary extract, age of host, and number of doses of hemin on pituitary gonadotropic extracts showed that the addition of hemin produced augmentation of ovarian weight but a reduction in the percentage of solids. The average ovarian weight for 80 rats which received pituitary extracts alone was 50 mg. Additions of 0.5 mg. of hemin per dose produced ovarian weights of 220 mg. in 80 other animals. The levels of ovarian weights with pituitary extract injections of 3, 6, 12, and 24 mg. were 34, 135, 196, and 154 mg. Ovarian weights of 40, 88, 138, 176, and 232 mg. were evidenced by respective groups of 32 rats each receiving 4, 8, 12, 16, and 20 injections. The weights of the ovaries also increased rather uniformly with the age of the experimental rats, being 120 mg. for those 21 days old at the beginning of the injection period and 150 mg. for those 31 days old. Variations in the decline of ovarian solids were caused by the pituitary dosage, number of injections, age of rats, and age of rat interacting with the pituitary dosage and number of injections.

The effect of progressive iodination followed by incubation at high temperature on the thyroidal activity of iodinated proteins, E. P. Reineke, M. B. Williamson, and C. W. Turner. (Mo. Expt. Sta.). (*Jour. Biol. Chem., 147 (1943), No. 1, pp. 115–119*).—The thyroidal activity of iodinated proteins of casein and soybeans with from 6- to 38-gm. additions of iodine per 100 gm. of protein was measured by decreases in the body length caused by injection into tadpoles, as previously investigated (E. S. R. 89, p. 135). With the incubation temperature of 70° [C.] for 18 to 20 hr., the thyroidal activity started at a relatively low level, which gradually increased to a maximum when sufficient iodine was added for the substitution of 2 atoms per mole of tyrosine. This activity then decreased with further iodination. Casein with 19 gm. of iodine per 100 gm. of protein proved the optimum amount and gave an assay response of 8.5 percent that of thyroxine. Soybean protein showed a maximum response of 5.25 percent of the activity of thyroxine when 17.5 gm. of iodine were added per 100 gm. of protein.

Seasonal variation in the semen of bulls, R. W. Phillips, B. Knapp, Jr., L. C. Heemstra, and O. N. Eaton. (U. S. D. A.). (*Amer. Jour. Vet. Res., 4 (1943), No. 11, pp. 115–119, illus. 1*).—Confirming the results of Erb et al. with dairy bulls (E. S. R., 88, p. 614), the highest percentage of fertility in 1,135 matings of Beef and Milking Shorthorn bulls was 59.6 percent in April and the lowest 40.8 percent in August. The characteristics of the semen obtained at 2-week intervals throughout the year in artificial vaginas showed significant differences for the breed groups in the larger volume and total number of sperm obtained from the Milking Shorthorns as contrasted with Beef Shorthorn bulls. Significant or highly significant individual differences among bulls were observed.

Effect of pH and certain electrolytes on the metabolism of ejaculated spermatozoa, H. A. Lardy and P. H. Phillips. (Wis. Expt. Sta.). (*Amer. Jour. Physiol., 138 (1943), No. 5, pp. 741–746*).—Continuing studies of the energy metabolism of ejaculated sperm (E. S. R., 86, p. 768), several experiments showed the optimum pH values for the endogenous respiration of bull, cock, and rabbit spermatozoa to be 7, 7.25, and 6.8, respectively. At the optimum pH the endogenous respiration (O_2 per 100 million sperm per hour) for the bull, cock, rabbit, and ram sperm averaged 21, 7, 11, and 22, respectively. Varying the phosphate concentration of the medium from 0 to 0.03 M did not greatly affect the respiration of the bovine sperm, but glycolysis and motility were greatly depressed in the presence of glucose and the absence of phosphate. The effect on glycolysis was not consistent, but the omission of Mg^{++} from the medium depressed respiration, glycolysis, and motility in most specimens. The presence of manganese and calcium ions depressed motility, glycolysis, and respiration. At least 0.005 M K^+ was necessary for optimum motility, and even more was needed for respiration and glycolysis.

Inhibition of sperm respiration and reversibility of the effects of metabolic inhibitors, H. A. Lardy and P. H. Phillips. (Wis. Expt. Sta.). (*Jour. Biol. Chem., 148 (1943), No. 2, pp. 333–341*).—Carrying further the studies of respiration and metabolism of sperm, noted above, it was found that malonate, benzoate, fluoride, and hydroquinone inhibited respiration and motility of ejaculated bull sperm, the action of which was largely reversible. Respiration and motility of sperm were inhibited by indole, maleate, selenite, arsenite, *dl*-glyceraldehyde, and quinone actions which were irreversible except for the inhibition of motility by maleate which was reversible in the presence of glucose. Cyanide and azide inhibited sperm respiration. The inhibition by cyanide was reversible and that by azide partially reversible. Exposure of a specimen of bull sperm to 0.0025 M *p*-phenylenediamine for 30 min. increased the nitrogenous respiration sixfold.

Inhibition of sperm glycolysis and reversibility of the effects of metabolic inhibitors, H. A. Lardy and P. H. Phillips. (Wis. Expt. Sta.). (*Jour. Biol. Chem., 148 (1943), No. 2, pp. 343–347*).—Glycolysis of ejaculated bull sperm was not inhibited by 0.01 M of malonate and benzoate. Glycolysis was stimulated in cases of treatment with cyanide, maleate, and hydroquinone. The stimulating effect of maleate and hydroquinone on sperm glycolysis was not reversible. Lactic acid production was inhibited by 0.00025 M quinone. Fluoride (0.01 M) completely and reversibly inhibited glycolysis. Pyruvate reversed fluoride inhibition, but motility was not regained. With transfer of fluoride-inactivated sperm to fresh yolk buffer, vigorous motility was regained. Inhibition of sperm glycolysis by azide was almost completely reversible, but inhibitions by iodoacetate and *dl*-glyceraldehyde were irreversible.

Influence of pregneninolone and pregnenolone on spermatogenesis in hypophysectomized adult rats, J. H. Leathem and B. J. Brent. (Rutgers Univ. et al.). (*Soc. Expt. Biol. and Med. Proc., 52 (1943), No. 4, pp. 341–343*).—The daily subcutaneous administration of 10 mg. of pregnenolone maintained spermatogenesis for at least 20 days in hypophysectomized male rats, but the weight of the testes was reduced somewhat and the seminal vesicles atrophied to nearly the weight of the controls. Seminal vesicle weights were somewhat better maintained by the daily administration of 10 mg. of pregneninolone in peanut oil than by implantation. A single injection of pregnenolone had no influence on the uterine weight or adrenal production of spayed mice. Pregneninolone failed to maintain spermatogenesis in hypophysectomized males. The study was conducted with 27 operated and control male rats and 11 spayed mice.

The determination of the concentration of spermatozoa in fowl and bull semen, C. S. Shaffner and F. N. Andrews. (Ind. Expt. Sta.). (*Anat. Rec., 86 (1943), No. 1, pp. 99–107, illus. 2*).—Samples of bull semen collected in artificial vaginas and fowl semen collected by the massage method were centrifuged at 3,000 r. p. m. for 15 min. in capillary tubes of 0.5, 0.8, and 1 mm. diameter for the separation of spermatozoa and plasma. There were no significant differences in the sperm cell volume of bull semen tubes with the different inside diameters or after storing. There was a 25-percent increase in the volume of solid material from the fowl semen stored for 12 hr. at 25° C., but the increase did not occur when fowl semen was stored in ice water. Storage of bull sperm for 56 hr. at 25° did not bring about a significant change in the volume of the solid material. Correlation coefficients of 0.76 and 0.80 were found between the hemocytometer cencentration count and the centrifugation volume determinations for 31 samples of fowl and 45 samples of bull semen, respectively.

The effects of l-tyrosine, l-phenylalanine, and l-arginine upon the differentiation of fertilized tubal rabbit ova, B. J. Miller and S. P. Reiman (*Growth, 7 (1943), No. 1, pp. 73–81, illus. 4*).—Ova from 7 does cultured in three strengths of *l*-tyrosine were larger than the controls, and there were some differences in cell type. Optimum results were obtained in a M/10,000 solution. Ova cultured in *l*-phenylalanine were larger than the controls, but not so large as those cultured in *l*-tyrosine and the differentiation was not so great. There was no difference in size over the controls in ova cultured in M/10,000 and M/50,000 arginine.

Dramatic response of the chick oviduct to estrogen, S. S. Munro and I. L. Kosin (*Poultry Sci., 22 (1943), No. 4, pp. 330–331*).—Further study showed that the 0.1-mg. dose of α-oestradiol (E. S. R., 84, p. 463) was close to the threshold of oviduct response. Increased doses up to 2 mg. in the first and 4 mg. in the second experiment showed progressive increases in oviduct weight, reaching a peak of 2,292 mg. with 3.2-mg. doses. Increases in the oviduct weight up to 80 times the controls were attained with oestradiol doses up to 3 or 4 mg. per 100 gm. of body weight. There were four chicks employed at each dose level.

Copper-induced pseudopregnancy facilitated by pretreatment with estrogen, A. Dury and J. T. Bradbury. (U. S. D. A.). (*Amer. Jour. Physiol., 139*

(*1943*), *No. 1*, *pp. 135–138*).—Appropriate doses of oestrogen make rats as responsive to intravenous copper acetate injections resulting in pseudopregnancy as normally occurs at oestrus (E. S. R., 87, p. 362). Pretreatment with oestrogen makes possible the induction of ovulation and pseudopregnancy in the anoestrous rabbit. In the study, preudopregnancy was induced in 50 rats injected with copper at the time of oestrus, but pseudopregnancy did not occur in rats not in oestrus. Seventeen rabbits were employed in studies of oestrogen and copper injections which showed that intravenous copper injections after ovulation caused pseudopregnancy.

Studies on transplanted embryonic limbs of the chick.—I, the development of muscle in nerveless and in innervated grafts, H. L. EASTLICK. (Wash. State. Col.). (*Jour. Expt. Zool.*, *93* (*1943*), *No. 1*, *pp. 27–49*, *illus. 12*).—The transplantation of limb buds and innervated grafts in chick embryos and chicks after hatching showed that a nerve supply was necessary for continued differentiation and maintenance of muscle fibers in limb grafts of embryos older than 10 days' incubation. In addition to an adequate nerve supply, the development and maintenance of embryonic muscle fibers required normal attachment, tension, activity, etc.

Rumplessness of chicken embryos produced by mechanical shaking of eggs prior to incubation, W. LANDAUER and L. BAUMANN. ([Conn.] Storrs Expt. Sta.) (*Jour. Expt. Zool.*, *93* (*1943*), *No. 1*, *pp. 51–74*, *illus. 3*).—In further study of rumplessness in the fowl (E. S. R., 77, p. 319) this abnormality was found to occur in about 1 percent of 2,996 chicks which hatched and embryos which died in the shell after the seventeenth day of incubation. It increased to nearly 9 percent in chicks hatched from eggs shaken prior to incubation. A machine shaking the eggs through the long axis was more effective in causing rumpless chicks than a machine shaking the eggs through the short axis. In groups of nearly 150 eggs, each shaken for 1, 2, and 3 hr. with and without 24- or 48-hr. rest periods, the frequency of rumpless embryos tended to be greater as the period of shaking was lengthened. When a rest period intervened between shaking and incubation the percentage of rumpless embryos was reduced. A seasonal trend was noted showing more rumpless embryos in eggs set between May 20 and July 28 than in eggs set prior to May 13. Significantly more rumpless embryos occurred in eggs which were shaken without a rest period before incubation than in embryos from eggs allowed a rest period. It was apparent that the frequency of rumpless embryos increased with holding the eggs. The appearance of rumpless embryos increased in eggs removed from shaking after 12 to 24 hr. of incubation. There thus appeared to be critical periods in incubation in which shaking was more likely to induce the formation of rumplessness in the embryos. The individuality of the dam contributed to the occurrence of rumplessness, as ascertained from the tendency of the progeny of some dams to show the abnormality to a greater extent than others. There was no correlation between early embryo mortality and the occurrence of the rumpless condition. Morphological features of the skeleton were the same in sporadic and experimentally produced accidental rumplessness, but in a few cases caudal scoliosis was observed in shaken material.

Influence of adrenalectomy and of adrenocortical steroids on liver arginase, H. FRAENKEL-CONRAT, M. E. SIMPSON, and H. M. EVANS. (Univ. Calif.). (*Jour. Biol. Chem.*, *147* (*1943*), *No. 1*, *pp. 99–108*).—In experiments with immature, hypophysectomized, adrenalectomized, and normal female rats, adrenalectomy caused a decrease in the arginase activity of the liver. Increases in the liver arginase followed the administration of small amounts of corticosterone, 11-dehydrocorticosterone, and 11-dehydro-17-hydroxycorticosterone. Slight or nonsignificant effects were produced by desoxycorticosterone and the sex hormones. The effects of adrenocortical hormones on enzyme systems were considered basically responsible for the role of the adrenal gland in the control of carbohydrate and protein metabolism.

FIELD CROPS

Some additional lattice square designs, W. G. Cochran. (Coop. U. S. D. A.). (*Iowa Sta. Res. Bul. 318 (1943), pp. 729–748*).—Additional experimental designs (E. S. R., 84, p. 466) are described for trials in which many varieties are compared. The plats in each replication usually are arranged in square formation, which allows varietal yields to be adjusted for fertility or other differences among the rows and columns of each replicate. The designs, similar to the balanced lattice squares developed by Yates, use a smaller number of replications. Statistical analysis, which differs only in minor details from that of a balanced lattice square, is illustrated by means of a numerical example, and formulas for the standard errors of the adjusted varietal yields are derived and discussed. Comment is also made on the field lay-out and on the relative accuracy of lattice and lattice square designs.

Lattice and lattice square designs with oat uniformity data and in variety trials, I J. Johnson and H. C. Murphy. (Iowa Expt. Sta. coop. U. S. D. A.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 4, pp. 291–305, illus. 2*).—A uniformity test with oats comprised 3,942 single-row plats 8 ft. long combined to form 657 three-row plats 16 ft. long and 990 four-row plats 8 ft. long. The plats were variously arranged to study lattice and lattice square designs assuming 25, 36, 49, and 81 varieties. Arrangement of blocks in lattice designs to form a compact complete replication reduced error variance of the randomized complete block but did not modify materially the variance of the lattice design. The relative precision of lattice squares exceeded that for triple lattices and simple lattices, in order. Average precision for lattice and lattice square designs in comparison with randomized complete blocks as 100 ranged from 155 to 224 percent. Gains in precision of different sets of a lattice design were in general agreement with variation in soil heterogeneity over the uniformity test plat. Variances of four- and three-row plats in comparable lattice and lattice square designs were about equal. The relative precision of lattice and lattice square designs was also studied in 33 trials with oats varieties and selections. Adaptation of lattice and lattice square designs to nursery plat trials with small grain is discussed.

Comparative values of crops for different sections of Minnesota: Data from experiment station trials, 1921–41, H. K. Hayes (*Minnesota Sta. Bul. 365 (1943), pp. 14*).—Crop performance in varietal trials, 1921–41, at six stations indicated the relative worth of the several crops on the basis of yields, cash value, and digestible nutrients. Cash values per acre are based on yields and average Minnesota farm prices December 1, 1921–35, and November 15, 1936–41. Yields, 1921–32, have been noted (E. S. R., 73, p. 31).

Winter wheat, well adapted to regions represented by University Farm, Waseca, and Grand Rapids, outyielded spring wheat by about 3.5 bu. (average) during both periods. Durum wheat outyielded spring wheat by 3.8 bu. at University Farm, Waseca, and Crookston, 1921–32, while both yielded similarly 1933–41, probably because many spring wheats then under trial were resistant to both leaf and stem rusts. From 1933 to 1941, adapted Minhybrids outyielded corn varieties at University Farm 8.3 bu. per acre or 19.6 percent, Waseca 9.9 or 15.9, Morris 8.7 or 20.7, Crookston 7.9 or 26.3, and Grand Rapids 4 bu. or 12.8 percent. The average yield of barley, 1921–41, ranged from 28.9 bu.

at Grand Rapids to 50.9 bu. at Waseca and for oats from 54 bu. at Duluth to 71.1 bu. at Waseca.

The three more desirable small grains and flax, as to cash value per acre, were for University Farm, winter wheat $23.93, hard red spring wheat $21.90, and durum wheat $21.54; Waseca, flax $32.58, winter wheat $26.57, and durum wheat $24.74; Morris, flax $24.34, durum wheat $22 25, and hard red spring wheat $20.98; Crookston, flax $23.09, durum wheat $21.63, and hard red spring wheat $19.87; Grand Rapids, winter wheat $19.02, rye $18.10, and oats $16.98; and Duluth, flax $21.30, hard red spring wheat $17.20, and oats $16.20. Corn and soybeans compared as follows: University Farm, corn $23.59 and soybeans $21 63; Waseca, $34.29 and $25.22; Morris, $24.70 and $21.89; Crookston, $17.97 and $17.28; and Grand Rapids, $16.75 and $14.34.

Soybeans grown 1933–41 averaged at University Farm 17.2 bu. per acre, Waseca 22.9, Morris 16.3, Crookston 15.6, and at Grand Rapids 10.8 bu. Calculated digestible protein produced per acre, 1921–41, was 333, 388, 337, 266, and 203 lb., respectively. Corn led in total digestible nutrients per acre at all stations where grown and surpassed barley, its nearest competitor, by 488 lb. at University Farm, 1,066 at Waseca, 721 at Morris, and 225 lb. at Crookston. At Grand Rapids corn exceeded rye by 61 lb.

Field-crop experiments at the Conservancy District Substation, 1938–1942, R. STROUD (*New Mexico Sta. Bul. 304* (*1943*), *pp. 28, illus. 9*).—Crops experiments continuing and supplementing those noted earlier (E. S. R., 85, p. 753) are reported and the information brought up to date.

The better-performing varieties included Thatcher spring wheat; Trebi, Club Mariout, and Atlas, rough-awned, and Arivat, Flynn, Vaughn, Conway, and Velvon smooth-awned spring barleys; Golden June and B & B Yellow Dent corn; Iowealth TX1 and 31A, Pioneer 332, Indiana 813, Iowa 3110, Reid National 134th4 and 134D, and U. S. 13 corn hybrids; Atlas sorgo; Laredo soybeans; U. S. 7 and 22 curly top-resistant sugar beets; and Hairy Peruvian, Argentine, and New Mexico Common alfalfa. Pasture mixtures are indicated for good land and for alkali or seepy alkali soil. Sugar beet seed yields rose in response to manure, ammonium sulfate, and green manure, and alfalfa yields to phosphate and manure.

Efficiencies of the lespedeza-small grain annual rotation in Missouri, W. C. ETHERIDGE. (Univ. Mo.). (*Jour. Amer. Soc. Agron., 35* (*1943*), *No. 3, pp. 212–215*).—Missouri farming in recent years has changed extensively from corn domination to pastures and forages as the main feature, largely due to Korean lespedeza (more than 8,000,000 acres in 1941), implemented by continuous annual rotation with small grain. This rotation, now practiced on most Missouri farms, is productive, safe, good for land, and profitable. The 1942 record numbers and productive condition of cattle, sheep, and swine in Missouri are considered proof of the merits of the pasture farming system.

The carotene and protein in oats and barley at different stages of growth, A. M. SMITH and W. ROBB (*Jour. Agr. Sci.* [*England*], *33* (*1943*), *No. 2, pp. 119–121*).—Amounts of N and β-carotene were determined in oats and barley plants at different growth stages and with and without a late top dressing of ammonium sulfate. The N decreased steadily until the kernels began to fill and was markedly increased throughout by the extra N. β-Carotene, which accounted for about 80 percent of the crude carotene in the oven-dried material, continued to fall until it reached very low values in the ripe crop. A very close correlation (+0.94) was noted between total N and carotene in the plant.

Crop response to hormone seed treatments, T. A. Kiesselbach. (Nebr. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 4, pp. 321–331, illus. 1*).—Applications of hormone seed treatments had no important significant effects upon germination, seedling development, maturity, or yields of field-grown corn, oats, barley, and soybeans. Vegetative responses were essentially alike for open-pollinated, inbred, and F_1 and F_2 hybrid corn. Excessive treatment of corn retarded germination, reduced stands and seedling vigor, and delayed flowering.

Commercial hormone dusts for seed treatment: A second report, S. T. Dexter (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 279–282*).—No benefits were obtained from the treatment of seed of a number of field crops in further tests (E. S. R., 87, p. 194) of hormone dusts or sprays.

Fiber production in the Western Hemisphere, L. H. Dewey (*U. S. Dept. Agr., Misc. Pub. 518 (1943), pp. 95+, illus. 74*).—Plant fibers other than cotton and flax, produced commercially in the Western Hemisphere, are described, with discussion of names, adaptation and distribution, cultural and harvesting practices, extraction and preparation of the fibers, markets, uses, and New York prices. Brief notes are included on other fibers produced on a smaller scale. The fiber plants are classified and described as long or multiple-celled, hard or leaf fibers—henequen, sisal, piteira, fique, yucca, pita floja, and abacá, and the palm fibers, and soft or bast fibers—hemp, cadillo, jute, and ramie; short or one-celled fibers—kapok, pochote, and samohu; and miscellaneous roots and stems—broomroot and treebeard.

Fibras vegetales y su producción en América [Plant fibers and their production in America], L. H. Dewey (*Unión Panamer. Ofic. Coop. Agr., Pub. Agr. No. 137–140 (1941), pp. 101+, illus. 75*).—A Spanish edition of the above publication.

A comparison of the first year's root production of seven southern grasses established from seed, G. W. Burton. (U. S. D. A. and Ga. Coastal Plain and Ga. Expt. Stas.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 3, pp. 192–196, illus. 2*).—In total root production on Tifton sandy loam in 1939, the Bahia grasses (*Paspalum notatum*) had nearly three times as much dry roots as any of the other grasses, four times as much as carpet grass (*Axonopus affinis*), and seven times as much as vasey grass (*P. urvillei*). Roots of the Bahia grasses were coarser and the roots of *P. malacophyllum* and woolly fingergrass (*Digitaria eriantha*) were finer than roots of the other species studied. The maximum depths reached by the roots of these grasses did not differ greatly, although over three-fourths of the total roots produced by vasey and carpet grass, best adapted to low, wet areas, were in the upper 8 in. of soil, while three-fourths of the roots of the Bahia grasses (better adapted to dry, sandy soil) were in the upper 20 in. of soil.

Atmospheric drought tests of some pasture and turf grasses, J. C. Carroll. (Ohio Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 1, pp. 77–79*).—When kept at 35°–37° C. and a relative humidity of 20 percent for 18 and 24 hr., carpet and Bermuda grasses excelled in resistance to atmospheric drought. Kentucky bluegrass, cocoos bent, and redtop were the most resistant of the northern grasses and the fescues least resistant. Grass receiving ammonium sulfate was injured more than that not fertilized.

Grasses for cover on soils deficient in organic matter, C. M. Harrison (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 318–324, illus. 6*).—Seeds mixtures were sown in 1939 on variously treated plats along a new highway largely on Bellefontaine and Miami sandy loams from which the top layer of from 6 to 18 in. of soil had been removed in grading. Observations in September 1942 led to the suggestion that under most conditions in Michigan, the finer grasses can generally be sown with fair success in early spring, before May 1, and from August 15 to September 15. When seedings must be made from May 1 to August 15, grasses more drought-enduring should be selected. Chewings, red, and sheep fescues should predominate in all mixtures on soils low in organic matter. Seeding unadapted grasses or sowing adapted grasses at the wrong season has only resulted in poor cover. Smaller percentages of quick-growing nurse grasses should be included in the mixtures to cut down severe competition with desired grasses. Heavy seeding rates do not substitute for good seedbed preparation, adapted seed, or timely planting.

The effects of climate and grazing practices on short-grass prairie vegetation in southern Alberta and southwestern Saskatchewan, S. E. Clarke, E. W. Tisdale, and N. A. Skoglund (*Canada Dept. Agr. Pub. 747 (1943), pp. 53+, illus. 11*).

Curing early-cut hay on tripods, E. Vander Meulen (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 336–341, illus. 5*).—Field results and observations, 1941–42, at the Upper Peninsula Substation indicated that wilted green hay, free from external moisture, could be cured on tripods during adverse weather conditions with only a slight loss in quality. Hay in properly constructed tripod stacks cured satisfactorily and retained most of the leaves and also the green color, except on the small exposed surface. Directions for use of tripods and a diagram for their construction are included.

Good pastures, A. T. Semple and M. A. Hein (*U. S. Dept. Agr., Farmers' Bul. 1942 (1943), pp. 22+, illus. 21*).—Essentials for more productive pastures are described, and methods of establishing good pastures are outlined, with discussions of ways of increasing food production of meat, milk, and other wartime crops by effective use of pasturage.

Pastures of Puerto Rico and their relation to soil conservation, H. W. Alberts and O. Garcia-Molinari (Coop. P. R. Univ. Expt. Sta.). (*U. S. Dept. Agr., Misc. Pub. 513 (1943), pp. 46+, illus. 15*).—Information on pasture lands; classes of livestock; pasture grasses, legumes, supplements, weeds, grazing capacity, and palatability of herbage; and on methods of establishing, managing, and improving pastures, considered of immediate value to farmers and livestock men in Puerto Rico and neighboring tropical islands, is based on research at the soil conservation station at Rio Piedras and interviews with landowners and stockmen. Methods of pasture improvement that conserve the soil and increase yields are also discussed.

The effect of certain pasture practices on runoff and production of protective cover, J. L. Haynes and O. R. Neal (U. S. D. A. and N. J. Expt. Stas.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 3, pp. 205–211*).—Effects of management practices, i. e., rotational and continuous grazing and fertilization, on runoff, erosion, and yield were studied, 1938–41, on pasture (on Dutchess stony loam at Sussex, N. J.) seeded in 1937 with clovers, Kentucky bluegrass, redtop, and timothy. After the seedings became established, erosion losses were small and not significantly different among treatments. Runoff losses differed with treatment only in 1938, when rainfall was unusually heavy, and water losses were significantly higher from unfertilized areas grazed continuously. Areas rotationally grazed with fertilizer made the higher yield, as measured in gains of dairy heifers. The percentage of available forage utilized by grazing animals was less under rotational than under continuous grazing.

Runoff from pasture land as affected by soil treatment and grazing management and its relationship to botanical and chemical composition and sheep production, L. E. Gard, R. F. Fuelleman, C. A. Van Doren, and W. G.

KAMMLADE. (Ill. Expt. Sta. and U. S. D. A.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 4, pp. 332–347, illus. 2*).—A report is made on continued studies (E. S. R., 85, p. 337). Limestone and phosphate and regulated grazing reduced runoff, July 1938 through June 1942, the least, 3.4 percent of the total precipitation of 140.1 in., being from the treated and moderately grazed plat. Value of permanent pasture cover in controlling erosion was demonstrated by the small quantities of soil lost. Kentucky bluegrass in hay samples from the treated, moderately grazed area rose from 250 lb. per acre in 1940 to 850 lb. from the first cutting in 1942, while little bluegrass was present on untreated plats. During the first season of severe grazing, from two to three times as many days' pasturage were obtained from severely grazed as from moderately grazed plats, while in following years on treated land, severe and moderate grazing provided about the same number of pasture days. An increase of 132 lb. of live weight per acre on treated land was in favor of moderately grazed pasture. On untreated areas, gains in weight of sheep were 79 lb. per acre in favor of regulated grazing. The returns suggest that soil treatment should pay for itself within 2 yr.

Kentucky bluegrass was the most desirable permanent pasture grass for a continuous cover on treated land and redtop the best available for pasturage on untreated soils. Satisfactory stands of lespedeza were maintained only by moderate grazing and soil treatment. Severely grazed plats were much weedier than moderately grazed plats and untreated than treated plats. Forage samples from treated plats contained higher percentages of protein and P than those from untreated plats.

High-grade alfalfa hay: Methods of producing, baling, and loading for market, W. H. HOSTERMAN (*U. S. Dept. Agr., Farmers' Bul. 1539, rev. (1943), pp. 30+, illus. 14*).—A revision (E. S. R., 61, p. 129).

Induced vivipary in three varieties of barley possessing extreme dormancy, M. N. POPE and E. BROWN. (U. S. D. A.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 2, pp. 161–163, illus. 1*).—Vivipary was induced in Manchuria spring barley (E. S. R., 86, p. 470) and also in the very dormant Dentil, Abyssinian, and Meliton winter barleys. At harvest, from 24 to 27 days after flowering, from 21 to 58 percent of the treated seeds, depending upon variety, had produced seedlings, and every treated spike showed at least one. The stage of development of the seedlings varied, but maximum plumule length was about the same in spring and winter types. This suggested that at this early stage of growth in varieties tested no more dormancy exists in the embryo of winter than in spring barley, and that seed coats of both types were equally permeable.

Soil management for beans, J. F. DAVIS (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 342–350, illus. 1*).—Fertilizer experiments with field beans (E. S. R., 80, p. 475) over extended periods suggest the use of from 150 to 300 lb. per acre of fertilizer containing twice as much P as K, as 0–16–8 or 4–16–8, applied in a band about 1 in. to the side of and from 1.5 to 1.75 in. below the seed. If a drill equipped to so place the fertilizer is not available, the fertilizer intended for the beans may be applied to other crops in the rotation plus the fertilizer they too would receive. Sweetclover, an excellent green manure, should be plowed under when 8 or 9 in. high. Adverse weather, especially during blooming, may nullify advantages of fertilizers in increasing yields. Spacing of plants in the rows has had little effect on yield of beans until the distance between plants exceeds 8 in.

Seasonal variations in the growth and chemical composition of Kentucky bluegrass, E. M. BROWN. (Coop. U. S. D. A.). (*Missouri Sta. Res. Bul. 360 (1943), pp. 56, illus. 14*).—In a 4-yr. test, Kentucky bluegrass sown in September was more productive during its first year and the young grass began growth earlier in spring at a lower soil temperature than during any subsequent year. Top growth, after the first year, was very slow in early spring at temperatures below 50° F., increased rapidly during April, and reached a maximum May 1–15 at mean temperatures of from 60° to 64°. This spring peak of herbage production was associated with reproductive processes. Herbage production declined at summer temperatures near or above 80°, even with irrigation. If the moisture supply was adequate, a secondary peak of herbage production occurred in late August at a mean temperature of 74°, after which yields declined to low levels during October, when soil temperatures were nearly the same as in early May. Seasonal variations in herbage production were influenced by temperature, soil moisture, day length, age of sod, applications of sodium nitrate, semimonthly mowing, and the quantity of roots and rhizomes in the sod.

In Kentucky bluegrass herbage the crude protein content was higher and crude fiber and lignin contents were lower in spring and fall than during midsummer. The Ca and P contents were adequate at all times except during drought, when P fell slightly below minimum needs.

Root growth was more rapid during the first autumn and winter following a September seeding than in any subsequent period. Rhizomes developed not at all before spring and slowly during the first spring and summer. In older, dense sods, spring and fall were the more favorable for root and rhizome growth. Root growth was most active during early spring below 60°, but rhizomes developed faster in late spring and early summer. Summer irrigation accelerated decomposition of older bluegrass roots, probably beneficial, and hastened the death of older rhizomes, probably harmful to the grass. Autumn droughts retarded or inhibited root and rhizome growth during a period otherwise favorable.

Sugar and starch accumulated fastest in bluegrass rhizomes during late autumn (mid-October to late November), although carbohydrate storage also occurred during September and early October. Both the concentration and total quantity of carbohydrates decreased in the roots during late spring and summer.

Larger yields of herbage resulted from cutting once or twice annually at hay stages than from semimonthly mowing at either 1- or 2.5-in. levels. Clipping semimonthly to a 1-in. height had slight effect on quantity of roots in the upper 6 in. of sod, but repeated close mowing reduced the quantity of rhizomes by retarding development during spring and by increasing the rate of depletion in summer. In autumn rhizome development in 1-in. cut plats practically equaled that in 2.5-in. and hay-cut plats. A loss of carbohydrates from the rhizomes of watered bluegrass also occurred during summer, but drought protected rhizomes of unwatered bluegrass from exhaustion of stored carbohydrates at high summer temperatures. Sodium nitrate, 600–800 lb. per acre, increased but did not fully restore the growth vigor characterizing young grass.

Effect of nitrogen on anther color in Kentucky bluegrass, R. B. Griffith. (Ky. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 4, pp. 348–349*).—Anthers from treated Kentucky bluegrass strains contained significantly less pigment than those from the same strains receiving no $NaNO_3$, and the heavier application produced a greater difference in pigment content. Effects of environmental conditions on its formation and its behavior in solution indicated that the purple pigment is an anthocyanin.

Pasture returns from Ladino clover at Chatham, Michigan, E. Vander Meulen (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 329–333, illus. 2*).—An average of three dairy cows was pastured during 1942 on an acre of Ladino for a total of 44.5 days each. On the basis of milk production, with milk valued at $2 per hundredweight, a return of $66.72 per acre was obtained after deducting cost of supplementary feeds and $4.82 an acre for pasture rental and management practices. An acre of Ladino clover and one of common white clover-grass pasture supported one cow or seven sheep for 134 and 110 days, respectively. Production of green forage of Ladino clover totaled 34,416 lb., or 5,772 lb. of dry matter per acre. The high-protein and low-fiber content made Ladino a highly nutritive and palatable pasture forage which was highly relished by the dairy herd.

Popcorn in Iowa, J. C. Eldredge and P. J. Lyerly (*Iowa Sta. Bul. P54* (*1943*), *pp. 749–778, illus. 7*).—Practical information on varieties and cultural and harvesting methods involved in producing popcorn is set forth, with discussion of distribution and acreage, factors affecting popping expansion (E. S. R., 58, p. 430; 76, p. 32; 89, p. 40), and methods of popping. Brief report is made on variety, popping, and storage experiments.

Average yields (1932–33, 1935–37) ranged from 1,606 lb. of shelled corn per acre from Japanese Hulless (now listed as White Hulless by large distributors) to 2,472 lb. from White Rice and popping expansion from 14.5 for Spanish to 22.6 for Supergold (developed by A. M. Brunson). Consumer tests preferred Tom Thumb and Japanese Hulless on flavor, freedom from hulls, and tenderness. Fertilizer treatments had no effect on popping expansion or eating quality. Inferior quality of corn bought in grocery stores was due in part to the starchy, large-kerneled, inferior varieties sold, but primarily to low moisture content. Popcorn pops best at a moisture content between 12 and 13 percent. Corn properly stored through 14 yr. deteriorated only slightly in popping expansion. A slightly stale or rancid taste occasionally might be detected in corn 5 or 6 yr. old. Excess soft starch with a resulting poor popping expansion is commonly caused by immaturity, and freezing before maturity injures quality.

In storage tests, grain with the optimum moisture content became so dry within a week when stored in a heated room that it was unfit for popping. When shelled corn was stored in small lots under natural atmospheric conditions of humidity and temperature, the moisture and popping expansion fluctuated rather rapidly, and contrary to popular belief, did not remain in good popping condition. Corn in open containers in an ordinary room or kitchen cupboard during winter might be expected to lose its maximum popping expansion, due to drying, in 2 or 3 days.

Experiments with Irish potatoes: Time of planting, seed sources, varieties, irrigation, fertilizers, time of harvest, and storage of the spring crop, H. B. Cordner (*Oklahoma Sta. Tech. Bul. 18* (*1943*), *pp. 27, illus 4*).—Report is made on experiments, 1938–42. Warba and Red Warba have been earlier than and outyielded the standard Triumph variety. Certified northern-grown seed usually has been satisfactory, although Oklahoma-grown seed for the previous fall crop gave good results when planted as cut sets. Early varieties appeared to be more effective than very early planting in getting a crop before the high temperatures of late June and early July. Production in the Warba variety appeared to be affected least adversely when planting was delayed until March 26. Several irrigations during tuber development in May and early June have about doubled the yield of No. 1 tubers. A fertilizer test on a light sandy soil confirmed earlier results (E. S. R., 86, p. 620), with good response to a fertilizer with a 1 : 2 : 1 ratio, as 600 lb. of 4–8–4 per acre, preferably applied in bands about 2 in. to the side of the sets. Potatoes planted March 11 fully matured about July 1, making 142 bu. total and 138 bu. No. 1 per acre, and with harvests on June 20, 132 and 126 bu., and on June 15, 125 and 113 bu. No. 1. Growers evidently must receive higher prices for early harvests to compensate for loss in production.

Potatoes harvested in the spring crop were hard to keep in common storage because of high summer temperatures. At 80° F. and above considerable loss from decay resulted, whereas in refrigerated storage at 50° the tubers kept in very good condition. Immature tubers with skins or periderms damaged by harvesting and handling stored best at 50° following a 2-week curing period in the cellar at a moderate temperature and high humidity. If stored without refrigeration, potatoes kept best in an underground storage cellar. Their early maturity appeared to favor the keeping quality of the Warba varieties in comparison with Triumph. Heat damage to tubers in the field before harvest greatly lowered keeping quality. Tubers so damaged were preserved by direct storage at about 50°. Damaged tubers shriveled but did not decay in refrigerated storage and held up later when removed to room temperature. Washed potatoes packed either wet or dry in half-bushel baskets kept as well as unwashed ones.

Irish potato production in Oklahoma, H. B. Cordner (*Oklahoma Sta. Bul. 266 (1943), pp. 32, illus. 14*).—Recommendations based largely on the above experiments consider varieties, seed sources and preparation, time of planting, fertilization, irrigation, harvesting, and storage of the spring crop, and also fall crop production (E. S. R., 87, pp. 665, 666).

Differential growth response of certain varieties of soybeans to varied mineral nutrient conditions, D. I. Allen. (Coop. U. S. D. A.). (*Missouri Sta. Res. Bul. 361 (1943), pp. 43, illus. 26*).—Low concentrations of phosphate in the nutrient solution gave best forage yields with both Morse and Virginia varieties of soybeans (E. S. R., 75, p. 773; 77, p. 779), while high concentrations caused toxicity and reduced yields. Morse was much superior in ability to utilize the higher levels of K and Mg, while Virginia showed little increase in yield with increasing K above 1 or 2 mM per liter or Mg above 0.31 mM per liter of nutrient solution. Less striking differential variation was also shown with respect to N, P, and Ca concentrations. Virginia forage, as a rule, contained higher percentages of the cations and more Mg than that of Morse. The amount of K in the nutrient solution and the K percentage in the forage of both varieties were directly related, and an inverse relationship existed with respect to K and Mg percentages under the same conditions. With increase of Ca in the nutrient medium, Ca percentage in the forage increased and K and Mg percentages decreased. With increasing Mg supplies the Mg percentage increased in the forage and K percentages decreased, while the Ca composition changed little. Forage yield, in most series, had a greater effect in determining the total milligrams per culture of any element removed by the plants than percentage of that element they contained. Consequently, Morse removed more K, Ca, and Mg from the media, particularly at the higher levels of these elements.

Sugar-beet seed production in southern Utah, with special reference to factors affecting yield and reproductive development, B. Tolman (*U. S. Dept. Agr., Tech. Bul. 845 (1943), pp. 35, illus. 12*).—Agronomic experiments with sugar beets grown for seed, 1936–39, considered amounts of N and P applied, dates of application, and related factors affecting fertilizer response, such as planting date, plowing date, and variety.

Treble superphosphate, 300–400 lb. per acre, applied either in fall or split between fall and spring, gave consistent increases of about 1,000 lb. of clean seed per acre over check plats. Ammonium sulfate, 600 lb. per acre, gave additional increases of from 500 to 700 lb. in seed yield. Time of N application was relatively unimportant in all tests as long as it was by early March. Time of applying P was much more critical. At least half of the P to be applied should go on early in fall.

A relation existed between fall growth and the physiological process of photothermal induction of flowering during fall, winter, and spring. Planting date, time and method of seedbed preparation, and fertilizing practice all affected fall growth. Development and maintenance of an extensive growth of leaves to shade the soil and help create the most effective temperature range for thermal induction proved beneficial. Root reserves stored during the fall vegetative period are important in seed production only after induction has been enough to cause complete reproductive development. Maximum yields of highest quality seed evidently can be obtained only through integration of all factors affecting growth and reproductive development.

Depth of planting cane affects germination, R. J. Borden (*Hawaii. Planters' Rec.* [*Hawaii. Sugar Planters' Sta.*] *47* (*1943*), *No. 2, pp. 75–79, illus. 3*).—Seed pieces of the H 109, 31–1389, and 32–8560 varieties of sugarcane were planted in Makiki (alluvial clay loam) and Manoa (residual silty loam) soils with 1-, 3-, and 5-in. covers. Differences in germination and subsequent development were noted among depths of covering and varieties and soils as well, with the 5-in. cover being least dependable and satisfactory. A uniform and shallow covering is indicated for cane on either irrigated or naturally moist soils.

Cultural and fertilizer studies with sweet potatoes, muskmelons, and watermelons on Buckner coarse sand, V. E. Hollar and E. S. Haber (*Iowa Sta. Bul. P56* (*1943*), *pp. 801–823+, illus. 1*).—In sweetpotato experiments, 1939–42, made in the Muscatine Island district, highest yields of U. S. No. 1 sweetpotatoes came from 15-in. spacing of plants in 3 5-ft. rows and from planting on May 20 in 1940 and 1941 and on May 28 in 1942. With overhead sprinkler irrigation ridge culture did not yield better than growing the crop on the level. Need of the soil for high K, relatively high P, and medium N was shown. A 3–9–18 fertilizer at 500 lb. per acre produced yields of U. S. No. 1's equal to those produced by 750 or 1,000 lb. at three plant spacings. No difference in yield came from use of any one of four N sources in the complete fertilizer, use of starter solutions, liquid v. dry fertilizer, or times of applying fertilizer where green manures were used in the rotation. Yield response to manure and to manure-commercial fertilizer combinations varied in different seasons.

Research findings on muskmelons and watermelons are noted on page 542.

Agronomic tests of new resistant varieties and hybrids of hard red winter wheat in the presence of stem rust and hessian fly, L. P. Reitz, E. T. Jones, C. O. Johnston, and R. H. Painter. (Kans. Expt. Sta. and U. S. D. A.). (*Jour. Amer. Soc. Agron., 35* (*1943*), *No. 3, pp. 216–229, illus. 4*).—Many strains and varieties of winter wheat were tested in nurseries under generally favorable growing conditions at Manhattan, Kans., adverse conditions due mainly to stem rust infection at Ramona, Kans., and in the presence of large numbers of hessian fly at Springfield, Mo. Strains resistant to these pests gave satisfactory yield and test weight under all three environments. In general, susceptible varieties gave good results only at Manhattan since disease and insect injury were not serious factors. While Marquillo hybrids are not immune from rusts and hessian fly, their resistance and tolerance appeared, from these yield studies, to be of high economic importance. Inherent resistance and tolerance to insects and diseases evidently can give a considerable measure of protection to winter wheats of the central Great Plains.

HORTICULTURE

Storing victory garden surpluses will augment winter food supply, A. L. Stark (*Farm and Home Sci.* [*Utah Sta.*], *4* (*1943*), *No. 2, pp. 6–8, illus. 3*).—Information is given on the growing of vegetables, the practices of vegetable storage, construction of pits and houses, and the specific requirements of various crops.

Home storage of fresh fruits and vegetables, R. H. Daines and C. H. Nissley (*New Jersey Stas. Cir. 460 (1943), pp. 12, illus. 5*).—The general principles of storing perishable fruits and vegetables are discussed, with information on types of storage and the best method of handling various crops.

Experiments in the production of fall cucumbers, C. N. Clayton (*South Carolina Sta. Rpt. 1942, pp. 155–159*).—Information is given on the control of downy mildew, aphids, and other insects which make the growing of fall cucumbers difficult. By dusting at 5- to 7-day intervals from emergence to harvest, it was possible to produce satisfactory crops.

[Cultural and fertilizer studies with muskmelons and watermelons], V. E. Hollar and E. S. Haber (*Iowa Sta. Bul. P56 (1943), pp. 805, 819–823, illus. 1*).—Grown with overhead irrigation on Buckner coarse sand in Muscatine County, more early muskmelons were produced by planting on May 5 than by plantings on May 18 and June 2. Total yields and the date of the last picking did not vary significantly for the three planting dates. The delayed application of 250 lb. per acre of a 10–6–4 or a 4–8–8 material produced significantly higher yields than did an application of 8 tons of stable manure per acre.

In 1941, stable manure in combination with a delayed application of commercial fertilizer increased the yields of watermelons above those obtained by manure alone. In 1942, there was no significant difference in yield of watermelons from the two treatments.

Paprika breeding, W. C. Barnes (*South Carolina Sta. Rpt. 1942, pp. 148–150, illus. 1*).—A number of selections were made from stocks grown from seed imported from Yugoslavia just prior to the war. In addition, crosses were made between strains possessing desirable characteristics, such as mild flavor, good quality, and small placentas. Brief descriptions are given of some of the more promising varieties observed in the study. In the F_1 hybrids the pendant pod characteristic was found dominant over the erect type. In crosses between plants with dark- and light-colored leaves, the hybrids were intermediate.

Tomato experiments in the Ozarks, G. Rook and P. H. Shepard (*Missouri Fruit Expt. Sta. Cir. 30 (1942), pp. 14*).—Herein are discussed the results of fertilizer, cultural, and training trials with four varieties of tomato, Break o' Day, Marglobe, Pritchard, and Rutgers, grown for early-market and late-canning purposes. Rated on the basis of value for fresh market Break o' Day was first, but when rated for late-canning uses this variety was fourth and Pritchard was first. Pruning and staking were beneficial with Break o' Day and Pritchard, but retarded growth and fruit development in Marglobe and Rutgers. Mulching the soil with cured grass was beneficial with all varieties, promoting more uniform ripening, better foliage, cleaner fruit, less sunburn, and less cracking of immature fruits.

Tomato production in Missouri, T. J. Talbert and A. D. Hibbard (*Missouri Sta. Bul. 470 (1943), pp. 18+, illus. 3*).—General and timely information is presented on varieties, soil requirements, cropping systems, fertilization including the use of starter solutions, the growing of plants, the preparation of the soil, spacing, culture, saving the seed, disease and insect control, harvesting, etc.

Tomato fertilizer experiments, J. M. Jenkins, Jr., and W. C. Barnes (*South Carolina Sta. Rpt. 1942, pp. 152–154*).—As a result of trials extending over a period of years, the authors recommend that, when tomatoes are grown on good soil that has been limed and well cared for previously, from 500 to 1,000 lb. of a 5–10–5 or a 7–7–7 fertilizer is ample for producing good crops. At lower levels of fertility, the amount of fertilizer should be increased.

Tomato variety trials, J. M. Jenkins, Jr., and W. C. Barnes (*South Carolina Sta. Rpt. 1942, pp. 151–152*).—Of 12 tomato varieties grown in 1942, Marglobe led in total yield. Other high producers included Pritchard and Stokesdale.

The season of 1942, W. A. Ruth, H. W. Anderson, and W. P. Flint. [Ill. Expt. Sta.] (*Ill. State Hort. Soc. Trans., 76 (1942), pp. 43–60*).—A record is given of the prevailing weather in 1942, injury from freezing weather conditions, bloom and crop on various species of fruit, and the occurrence of diseases and insects.

New varieties and the fruit grower. H. L. Lantz. (Iowa Expt. Sta.). (*Ill. State Hort. Soc. Trans., 76 (1942), pp. 130–138*).—In a discussion of varieties and their regional adaptation, the author presents tabulated information on the comparative recovery of a large number of apple varieties following the severe 1940 November freeze. Six apples—Anoka, English Russet, Hibernal, Malinda, Peter, and Repka Malenka—and 13 seedling apples escaped injury. Among apples showing 90 percent recovery were Edgewood, Hawkeye Greening, Haralson, Milton, Secor, Wealthy, and Yellow Transparent.

The fertilizer value of an orchard mulch, J. H. Gourley. [Ohio Expt. Sta.]. (*Ill. State Hort. Soc. Trans., 76 (1942), pp. 289–295*).—The author sketches the history of experimental work in orchard fertilization and points out that local situations, such as the native composition of the soil, are a factor in determining nutrient needs of orchard trees. The function of mulches in supplying different nutritive elements, such as N, P, K, Ca, Mg, and B, is discussed, and the difficulty of building up the supply of organic matter in the soil is stressed.

Some additional facts on hardy apple stocks, T. J. Maney. (Iowa Expt. Sta.). (*Ill. State Hort. Soc. Trans., 76 (1942), pp. 138–143*).—Certain stocks produce more profound effects on growth and production of top-worked varieties than do any other cultural treatments. Virginia Crab, for example, dwarfs Mammoth Black Twig (=Arkansas); half dwarfs Turley, Winesap, and Willowtwig; and is fully incompatible with Stayman Winesap. The effect of intermediate stocks on yields was shown in a much larger total yield over several years for seven varieties on Virginia Crab than for the same seven on Hibernal. In a commercial orchard, the use of double-worked stocks on Virginia Crab, Haas, and Sheriff increased the life of Jonathan, Grimes Golden, and Gano trees above those grown on the usual French crab roots. Virginia Crab and Hibernal are apparently resistant to collar rot and also possess decided low-temperature resistance as shown following the 1940 freeze.

List of stocks used successfully in topworking apple varieties, T. J. Maney. [Iowa Expt. Sta.]. (*Ill. State Hort. Soc. Trans., 76 (1942), pp. 143–146*).—Lists are presented of compatible understocks for many varieties of apples, supplemented by observations on rootstock effects in a commercial orchard.

Development of the Yellow Transparent apple, R. V. Lott. (Univ. Ill.). (*Ill. State Hort. Soc. Trans., 76 (1942), pp. 420–425*).—Studies made in 1940, 1941, and 1942 of the physical and chemical changes occurring in Yellow Transparent apples during the period from bloom to maturity showed that as the season progressed the sugar concentration increased and the acid concentration decreased. Measurements of apples showed the importance of permitting the fruits to attain their maximum size that could be reached before becoming overripe if maximum yields are the goal. Compared with other varieties, Yellow Transparent had a low sugar and a high acid content. Friuts from overloaded trees were lower in sugar and usually lower in acid than those of trees bearing a light crop. Yellow Transparent apples were found to be at their optimum stage of maturity for picking when the flesh color became white. Maturity was too far advanced for commercial handling when the flesh had taken on a cream color.

A comparison of dust and liquid applications of a preharvest drop "hormone" to apples, W. A. Ruth. (Univ. Ill.). (*Ill. State Hort. Soc. Trans., 76 (1942), pp. 231–235*).—In the fall of 1942 a comparison was made on the Winesap apple of dusts and of sprays, both containing the sodium salt of naphthaleneacetic acid. Despite the fact that more of the active ingredient was applied per tree in the dust, the indications were definite that the spray gave the better results. In terms of percentage of weight of the entire crop, five dusted trees and eight sprayed trees from time of application to picking dropped roughly 58 and 25 percent of their fruits, respectively.

Absorption of moisture by apple boxes, S. A. Pieniazek (*Ice and Refrig., 103 (1942), No. 1, p. 43*).—Dry wooden crates when placed in a storage room, held at 32°–34° F. and 80–85 percent relative humidity, absorbed over 1 lb. of water per crate. Light-weight New England apple boxes absorbed considerably less water. Shredded oiled paper was also found to be highly absorptive. The absorption of moisture by the containers and the paper made it difficult to maintain high relative humidity during the initial period of storage.

A comparison of the performance of young Halehaven trees on Shalil and Carolina "natural" rootstocks, L. E. Scott (*South Carolina Sta. Rpt. 1942, pp. 131–133, illus. 3*).—One-year-old Halehaven peach trees budded on Shalil and on Carolina natural rootstocks were planted in the middle of an old Elberta orchard tract from which the trees had been recently removed. Practically all of the Elberta trees showed nematode galls on their roots. Both lots of young trees grew well in the spring following transplanting, but after a drought in August many of the trees on natural roots lost their older leaves while those on Shalil remained green and vigorous. A total of 82 of the 140 trees on natural roots died the first 2 yr. in the orchard as compared with only 5 of those on Shalil roots. Measurements showed that the Shalil trees were more uniform in development, a condition due apparently to their nematode resistance.

Growing plums in Missouri, P. H. Shepard (*Missouri Fruit Sta. Bul. 31 (1942), pp. 35, illus. 17*).—General information is presented on the growing, pruning, and spraying of plums, supplemented by descriptive and other pertinent information on varieties.

The influence of manure on the yield and size of fruit of the highbush blueberry, S. Johnston (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 374–376*).—In 1940 one-half of a group of 36 Rubel blueberry plants growing on a favorable soil and all receiving the same general cultural and fertilizer treatments was supplied with a cubic yard of horse manure early in the spring. The application was repeated in 1941, and in 1942 a cubic yard of cow manure was used. The 18 manured plants produced a total of 631 pt. of berries in the three seasons as compared with 639 for the nonmanured plants. The berries on the manured plants were slightly smaller.

Aerial propagation of muscadine grapes, W. T. Brightwell (*South Carolina Sta. Rpt. 1942, pp. 36–38, illus. 3*).—Successful rooting was obtained with bamboo tubes split on one side to admit the vine and filled with damp sphagnum moss.

Quinine from seed, B. Y. Morrison (*U. S. Dept. Agr., Off. Foreign Agr. Relat., Agr. in Americas, 3 (1943), No. 7, pp. 131–133, illus. 3*).—In experiments at the U. S. Plant Introduction Garden at Glenn Dale, Md., fresh cinchona seed was found to germinate abundantly in a period of from 11 to 20 days if sown on a surface of sifted sphagnum and protected with a glass and frame to conserve moisture. The favorable temperature was approximately 70° F., and the light had to be reduced greatly in intensity. Poor germination followed the use of old seed. The germinating medium should be acid in reaction. No special benefit followed the use of phosphorus or potassium fertilizers, and excesses in nitrogen led to overvegetative growth, undesirable from the propagation standpoint.

FORESTRY

Forests of the Cumberland Mountains, E. L. Braun (*Ecol. Monog., 12 (1942), No. 4, pp. 413–447, illus. 36*).—Studies on an area of some 5,000 sq. miles, located in Kentucky, Virginia, and Tennessee with an elevation of from 1,000 to 4,250 ft., suggest that the area was originally covered with a mixed deciduous forest of high quality. Forest composition varies with slope exposure and, to some extent, with altitude. Except in a few habitats, mixed mesophytic forests prevail. The nature of the undergrowth is correlated with the composition of the overhead canopy.

Some observations on cutover forests in the southern Appalachians, E. H. Frothingham. (U. S. D. A.). (*Jour. Forestry, 41 (1943), No. 7. pp. 496–504, illus. 4*).—Surveys made on 34 widely distributed timber-sale areas in the southern Appalachian area showed that cuttings did not generally result in a deterioration caused by an influx of less desirable species. Except in the yellow pine-hardwood type the desirable species were more than holding their own. When the numbers per acre of trees, poles, and saplings on areas cut-over 6 yr. or longer were correlated with the age and severity of the cutting, it was evident that light cuttings resulted, after 20 yr., in more than twice as many good timber trees as did heavy cuttings, an equal number of good poles, but considerably fewer good saplings. A method is proposed for classifying the potential qualities of stands on cut-over areas.

Northern Idaho forest resources and industries, S. B. Hutchison and R. K. Winters (*U. S. Dept. Agr., Misc. Pub. 508 (1942), pp. 75+, illus. 48*).—Herein are presented the results of a survey in the northern Idaho region covering a description of the area, a discussion of forest-resource ownership, forest-industry development, the fire problem, insect and disease problems, forest-management possibilities, economic factors, and recommendations for a program to conserve and utilize the forests. Appended are statistical data as to timber-yield calculations, ideal age distribution, volume tables, etc.

Future may see mahogany forests in Florida, S. J. Lynch and H. S. Wolfe. (Fla. Expt. Sta. and Univ. Fla.). (*Fla. Grower, 50 (1942), No. 8, pp. 6, 11, illus. 1; also in U. S. Dept. Agr., Forest Serv., Caribbean Forester. 4 (1943), No. 3, pp. 124–128, Span. abs., p. 128*).

A grading and counting machine for forest nursery seedlings, P. W. Robbins. (Mich. Expt. Sta.). (*Jour. Forestry, 40 (1942), No. 10, pp. 809–811, illus. 3*).—Plans are presented and the construction and operation described for an endless belt type of tree seedling grading machine. This grader makes it possible for a forest nursery to produce uniformly graded and accurately counted tree seedlings, using inexperienced labor. In 15 days of operation the machine, employing 12.5 men, averaged 102,500 trees per day, the equivalent of 8,200 trees per man, lifted, graded, counted, and tied ready for packing.

A machine for transplanting seedlings, W. H. Hildebrand. (U. S. D. A.). (*Jour. Forestry, 41 (1943), No. 7, pp. 476–479, illus. 3*).—A description is presented of the construction and operation of a celery planter which was modified to transplant forest seedlings.

Reaction of pinon and juniper seedlings to artificial shade and supplemental watering, G. S. Meagher. (U. S. D. A.). (*Jour. Forestry, 41 (1943), No. 7, pp. 480–482*).—Observations in northern Arizona upon seedlings of pinyon pine, oneseed juniper, and Utah juniper established in 1939 in a forest opening showed that germination was hastened by shading and watering treatments, but that final germination was not affected appreciably. Survival in 1941 was relatively high where seed spots were both shaded and watered, intermediate where watered or shaded alone, and zero where the spots were untreated. Most of the seedling losses were attributable to drought and frost.

The growth and development of the root systems of juvenile lodgepole pine, R. J. Preston, Jr. (*Ecol. Monog., 12 (1942), No. 4, pp. 451–468, illus. 16*).—A total of 105 trees was excavated by washing from two sites, one a fire lane on a gravelly sandy loam of glacial moraine origin and the other a large cut in an almost pure gravelly sand. In excavating the roots were carefully mapped and measured and, in addition, oven-dry weights were taken on the roots, needles, and woody parts of the crown. Significant differences were recorded between the root systems on the two sites with respect to number, length, spread, and mycorhizal development. On both sites the majority of the roots were in the upper 6 in. of soil, with a tendency for average depth to increase as the trees grew older. There was a great variation in the extent and form of root systems, irrespective of site. Top: root ratio for young lodgepole pines varied between 0.84: 1 and 4.03: 1, with a significant difference between the two sites. The roots grew continuously from the time the frost left the soil in the spring until it froze again in autumn.

Herbaceous vegetation a factor in natural regeneration of ponderosa pine in the Southwest, G. A. Pearson. (U. S. D. A.). (*Ecol. Monog., 12 (1942), No. 3, pp. 315–338, illus. 12*).—Grass is the prevailing type of ground cover in the pine forests of the Southwest. In general, grasses are predominant on the heavier soils and shrubs on the lighter soils. Trees and shrubs prefer porous soils favorable to deep root penetration and, with sufficient winter precipitation, older trees are relatively independent of summer showers. Pine seedlings, on the other hand, have to compete seriously with grass. Arizona fescue, a tall bunchgrass, is the most aggressive competitor of young pines because it grows during May and June when precipitation is at a minimum.

On certain plats seeded to pine and protected from rodents, grass was handled in various ways—from complete removal to a fully undisturbed condition. By far the best survival and growth of young trees was recorded on plats denuded and kept free of all competing vegetation. The poorest results were attained with the undisturbed grass. Clipping of the grass gave intermediate results, even though it did not appreciably influence soil moisture. Light appeared to be the secondary factor, with young pines in tall grass showing etiolation. The author suggests that managed grazing can assist pine reproduction, but that over-grazing is definitely harmful.

Relation between soil types and the growth of loblolly pine and shortleaf pine in east Texas, R. F. Chandler, Jr., P. W. Schoen, and D. A. Anderson. (Cornell Univ. and Tex. A. and M. Col.). (*Jour. Forestry, 41 (1943), No. 7, pp. 505–506*).—Studies on 14 plats, mostly 1 acre in area and located in the heart of the East Texas Pine Belt, showed that soil type was the best indicator of site quality for loblolly and shortleaf pines. Ochlockonee fine sandy loam, a soil derived from alluvial material of rather recent origin, was the best of the seven soil types studied for both species of pine. The various soils are described as to origin and profile development.

Growth response of white pine in the southern Appalachians to green pruning, L. I. Barrett and A. A. Downs. (U. S. D. A.). (*Jour. Forestry, 41 (1943), No. 7, pp. 507–510, illus. 1*).—The effects of four pruning treatments—(1) nothing, (2) light, from 6 to 15 percent of the living whorls removed, (3) moderate, from 16 to 25 percent removed, and (4) heavy, from 26 to 35 per cent removed—were studied on eastern white pines, ranging in size from 2 to 7 in. d. b. h., growing on the Toccoa Experimental Forest, Georgia. About 30 percent of the number of living whorls were removed without serious reduction in growth rates. Smooth, flush cuts favored rapid healing and clear timber formation. Where clear 16-ft. logs are desired and only one pruning is to be practiced, the cutting should be delayed until the trees are large enough so that not more than 30 percent of the living whorls will be removed up to a height of 17.3 ft.

Ecological factors influencing reforestation in northern Wisconsin, J. H. Stoeckeler and G. A. Limstrom. (U. S. D. A. coop. Univ. Minn. et al.). (*Ecol. Monog., 12 (1942), No. 2, pp. 191–212, illus. 17*).—Availability of soil moisture throughout the first growing season was found to be the most important single factor limiting the success of forest plantings and direct seedings in northern Wisconsin. Soil moisture was adequate, even in severe drought years, on areas with a shallow water table. However, such areas constituted only 5 percent of the acreage of potential forest sites. Successful planting of the remaining 95 percent might be attained by the use of drought-resistant species, use of larger planting stock, better soil preparation, and taking maximum advantage of overhead cover. The lower survival in the open than under cover is attributed to a marked reduction in evaporation rate. As to species, jack pine was found to have about twice as great a second-year lateral root spread as red pine. This rapid root extension accounted for the superior drought hardiness of the jack pine. One of the most important causes of failure of direct seeding was indicated in a screening experiment to be rodent damage, probably by white-footed mice. Losses in furrow seeding were due to the smothering of the seedlings by fallen leaves.

Availability of farm timber for Michigan's wood-using industry, C. Holcomb and P. A. Herbert. (Coop. U. S. D. A.). (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 356–360, illus. 2*).—There are over 1,300,000 acres of farm woodland in the 41 southern Michigan counties and at least that much more of other forest lands. With few exceptions, the woodlands are made up entirely of hardwoods, with some 20 species occurring in commercial quantities. The best-quality timber is produced when the woodlands are undisturbed by grazing or fire. Only 15 percent of the woodlands in southern Michigan are not grazed. Despite this lack of care, in 1939 the sawlog production in 37 southern counties was estimated at about 3 billion bd. ft., about one-third of which was red and white oak and some 569,330,000 bd. ft. was elm. In 1939 the woodlands were being cut at the rate of about 191 million bd. ft. per year, more than twice the amount that the woods should have supplied. The war has aggravated the situation. The authors emphasize the need for curtailing this cutting as soon as possible.

Marketing farm timber in Michigan, C. Holcomb and P. A. Herbert. (Coop. U. S. D. A.). (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 350–355, illus. 2*).—The authors point out the difficulties encountered by the farm wood lot owner in the marketing of his timber to best advantage. Among handicaps are a lack of equipment and knowledge as to how to cut logs, the presence of several species in the wood lot, and a lack of information as to the best outlets for saw timber. Local mills are often unable to saw lumber uniformly and have few or no facilities for kiln drying. Low prices for rough lumber bring reduced returns to the farmer. Small sawmills are generally unable to fill orders for a variety of sizes, grades, and kinds of lumber. The authors suggest that the wood lot owner should inform himself as to stumpage values and should call in several buyers to bid on timber with a view to obtaining the best possible prices for his product.

Empirical log rules according to species groups and lumber grades, F. X. Schumacher and H. E. Young (*Jour. Forestry, 41 (1943), No. 7, pp. 511–518, illus. 3*).—"The empirical log rule, derived by the method of least squares from the sawlog consumption and concomitant lumber production over a sequence of working days at the sawmill, is applied to the solution of two forestry problems—the effect of species groups upon the lumber produced from sawlogs of given dimension, and the distribution of lumber production among standard lumber grades."

A fence post service test in the Mississippi Delta, H. H. Muntz. (U. S. D. A.). (*Jour. Forestry, 41 (1943), No. 7, pp. 524–526*).—Of six species tested as fence post material near Stoneville, Miss., from February 1937 to November 1941, Osage-orange proved to be the most durable of the untreated species. In general, Osage-orange, black locust, and red mulberry were definitely superior to baldcypress, overcup oak, and honeylocust. Hill-grown black locust was superior to that grown on Delta soil. The season of cutting had little or no effect on durability. In general, the split posts were about as satisfactory as round posts.

Retention of creosote oil in the wood of Pinus occidentalis Swartz, E. S. Harrar and D. G. Reid (*Yale Univ. School Forestry, Trop. Woods, No. 71 (1942), pp. 33–35; also in U. S. Dept. Agr., Forest Serv., Caribbean Forester, 4 (1943), No. 3, pp. 129–131, Span. abs., p. 131*).

DISEASES OF PLANTS

Introduction to plant pathology, F. D. Heald (*New York and London: McGraw-Hill Book Co., 1943, 2. ed., [rev.], pp. 603+, illus. 246*).—In this revised edition of the text previously noted (E. S. R., 78, p. 791), an attempt has been made to incorporate new researches, as well as to make certain additions or eliminations on the basis of personal experience and suggestions from other plant pathologists.

The Plant Disease Reporter, [May 15 and June 1–15, 1943] (*U. S. Dept. Agr., Bur. Plant Indus., Soils, and Agr. Engin., Plant Disease Rptr., 27 (1943), Nos. 9, pp. 187–218, illus. 17; 10–11, pp. 219–232, illus. 8*).—The following are included:

No. 9.—Host-parasite check-list revision—*Arrhenatherum* to *Axonopus* (Gramineae), by F. Weiss; rusts and other diseases of safflower, by I. L. Conners; relative prevalence and geographic distribution of various ear rot fungi in the 1942 corn crop, by P. E. Hoppe; general seed treatment recommendations for field crops; some relations of potato production, late blight infection, and weather in 1942 to the current potato situation, by F. Weiss; brief notes on apple scab and rust development in New York, apple scab in Maryland, and blue mold of tobacco in South Carolina; and weather from the winter of 1941–42 to the winter of 1942–43, with maps adapted from the monthly charts in the *Monthly Weather Review*, December 1941 to February 1943.

No. 10–11.—Potato late blight in Wisconsin on June 7; potato late blight in 1942—a request for information; recent observations on the thread blight (*Corticium stevensii*) of tung and some native plants in the southeastern United States, by J. R. Large; the effect of root knot on fig seedlings, by A. L. Taylor; reports on apple scab in Rhode Island and apple scab and black rot in Ohio; downy mildew of bright tobacco in Virginia during the 1943 plant-bed season, by W. A. Jenkins; and brief notes on bacterial wilt of tomato in Texas and downy mildew of peas in Ohio.

A descriptive list of plant diseases in Southern Rhodesia (and their control).—Supplement 1—January 1940 to April 1943, J. C. F. Hopkins

(*Rhodesia Agr. Jour., 40 (1943), No. 3, pp. 178–192*).—The arrangement in this supplement[1] is by host plants.

Fungos do Rio Grande do Sul; Observados nos anos de 1940–41, J. P. da Costa Neto (*Sec. Estado, Negocios Agr. Indus. e. Com.* [*Rio Grande do Sul*] *Bol. 99 (1943), pp. 11+*).—An annotated list is presented of the fungi (arranged by host plants) observed in this Brazilian State during the years 1940–41.

The sizes of viruses and the methods employed in their estimation, R. Markham, K. M. Smith, and D. Lea (*Parasitology, 34 (1942), No. 3–4, pp. 315–352*).—In this comprehensive review (193 references), the authors critically examine the various available methods for determining virus particle sizes and endeavor to bring the ultrafiltration method into agreement with other procedures by suggesting a different factor for converting pore size to virus size from the factors commonly used. Throughout the paper they have recognized the probability that most viruses are hydrated in solution, and have distinguished between the size and molecular weight in solution v. the dried state. Formulas are presented suitable for interpreting centrifugation and diffusion data when the possibility of hydration is contemplated. It is believed evident that this complication, added to that of shape, makes it necessary for several measurements by different methods to be made before claims as to the size of a virus are valid. For this reason, only for three viruses (tobacco mosaic, tomato bushy stunt, and vaccinia) are the data considered adequate to enable the size, shape, and molecular weight, both dry and hydrated, to be stated. Though the position regarding knowledge of the absolute sizes is far from satisfactory, there has been amassed a large amount of data, and in some cases a selection has been made of what the authors consider best. Among matters treated in detail are electron microscope studies, hydration, and the viscosity of solutions of viruses. In order to obtain evidence as to the size of a virus, it is believed desirable to study it in as purified a form as possible and also to show that when "homogeneous" preparations are obtained they do not consist merely of macromolecular substances contaminated with a small quantity of virus. Furthermore, it is desirable to obtain at least sufficient data to enable the assessment of both size and shape of the particles rather than to assume some shape or some density value which may prove incorrect.

Evidence for the evolution of phytopathogenic viruses from mitochondria and their derivatives.—I, Cytological and genetic evidence, M. W. Woods and H. G. DuBuy. (Md. Expt. Sta.). (*Phytopathology, 33 (1943), No. 8, pp. 637–655, illus 8*).—When certain plastid- (chromosome-) controlled variegations were arranged into a series or spectrum, depending on the extent of modification of the plastid structure and function, consecutive regions of this spectrum showed an increasing similarity to certain virus diseases. In general, plastid-controlled variegations are characterized by typical sectorial or periclinal chimaeral structure in the variegated leaves, but many mosaic sectorial variegations occur which suggest that variegation-inducing chondriosomes may actually invade normal cells by intercellular passage at some critical stage of ontogeny. The variegation-inducing chondriosomes often behave like viruses with respect to their physiological action on the cell. A variegation of *Euonymus*, apparently of the chondriosomally controlled type, was transmitted by grafting to a previously nonvariegated stock plant. Like viruses, variegations usually are inherited metroclinously. It is suggested that viruses have been derived through mutation and natural selection from constituents of the chrondriosomes rather than from preexisting parasitic micro-organisms. In several cases variegation has been observed to arise spontaneously. Furthermore, the frequency of such plastid mutations in nature is sufficient to furnish a basis for this theory.

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[1] South. Rhodesia Dept. Agr. Mem. No 2 (1939), pp. 51+.

The sensitivity of plant viruses to certain inactivators, R. W. Fulton. (Univ. Wis.). (*Phytopathology, 33 (1943), No. 8, pp. 674–682*).—The sensitivity to inactivation by trypsin, milk, extract of *Phytolacca decandra*, bovine serum, and *Aspergillus niger* growth product was determined for the viruses of tobacco mosaic, potato ring spot, cucumber mosaic, tobacco ring spot, and bean mosaic. In general, the sensitivity of these viruses to the inactivators increased in their order as listed. The viruses of bean mosaic, tobacco ring spot, and cucumber mosaic, however, exhibited specific responses in that the order of sensitivity to certain inactivators was reversed. The virus extracts of tobacco mosaic and potato ring spot were much more concentrated than the other virus extracts but required only moderately higher concentrations of inactivators. The percentage of tobacco-mosaic virus inactivated was greatest when the mixture with inactivator was most concentrated and least when it was most dilute. As a whole, the results support the view that the effect of these "nontoxic" inactivators is on the virus rather than on the host.

The production of coacervates, H. S. Reed. (Univ. Calif.). (*Phytopathology, 33 (1943), No. 8, pp. 739–741, illus. 2*).—Coacervate formation in cells appears to be due to a disturbance of the hydrogen bonds in the catechol-water system in vacuoles. This phenomenon, which occurs frequently in cells of parasitized or starved plants, may also be reproduced in vitro. Technics are described for producing coacervates when a solution of lecithin in methylal is brought into contact with an aqueous solution of catechol, resorcinol, or pyridoxin. The formation of such globular masses was observed under the microscope. In solutions at pH 5.35 the catechol-lecithin coacervates were larger than in others with buffer values of pH 6 35 and 7.35. The central globule of catechol or pyridoxin was surrounded by a vesiculated layer of lecithin. These coacervates, like those in cell vacuoles, tended to coalesce into larger globules having a common lecithin envelope.

Behaviour of thiuram sulphides, etc., in spore germination tests, H. B. S. Montgomery and H. Shaw (*Nature [London], 151 (1943), No. 3829, p. 333*).—Using *Venturia inaequalis* as test organism, the authors report an "inversion" of toxicity within a limited range of concentration, toxicity to the spores decreasing as the concentration of fungicide increased. This phenomenon was noted with several thiuram sulfides, as well as with some dithiocarbamates. Possible causes are discussed.

Growth substances and the rust fungi, D. Gottlieb and H. Hart. (Minn. Expt. Sta.). (*Phytopathology, 33 (1943), No. 8, pp. 724–728*).—Thiamin-chloride, riboflavin, niacin, ascorbic acid, and β-indoleacetic acid were supplied to seedlings and maturing plants of wheat and oats by adding solutions to the soil, by immersing leaves in solutions, or by forcing solutions into substomatal leaf spaces or into developing boots. Reactions to seven physiologic races of *P. graminis tritici* in several varieties of wheat and to four physiologic races of *P. graminis avenae* in three varieties of oats were not changed in any way.

A cancerous neoplasm of plants produced by autonomous, bacteria-free crowngall tissue, P. R. White and A. C. Braun (*Amer. Phil. Soc. Proc., 86 (1943), No. 3, pp. 467–469*).—In continuation (E. S. R., 88, p. 774), the authors introduce further evidence that under the indirect influence of *Phytomonas tumefaciens* originally present in some distant part of the plant certain tissues of sunflower seedlings lose their characteristic behavior, cease to respond to normal morphogenetic restraints, acquire a capacity for greatly accelerated and disorganized growth, and thus produce invasive and potentially malignant tumors, this new behavior becoming an intimate function of the cells themselves, independent of any continued bacterial stimulation, so that affected tissues can be removed, cultured in vitro for long periods, and give rise to new tumors indistinguishable from those from which the cultures were derived, on reimplantation into new hosts of the same or related species. These are the same characteristics as those by which animal cancers are distinguished from healthy or merely inflammatory animal tissues. This plant material is deemed extremely promising for investigation of the biological basis of "the cancer problem."

Potato witches'-broom transmission by dodder and cure by heat, L. O. Kunkel (*Amer. Phil. Soc. Proc., 86 (1943), No. 3, pp. 470–475, illus. 4*).—The virus of potato witches'-broom, known to occur in Maine as well as in Canada and other countries, was transmitted to *Nicotiana glutinosa*, *N. rustica*, tomato, sugar beet, and *Vinca rosea* via dodder (*Cuscuta campestris*). In the high temperature plant *Vinca rosea*, the disease was cured by heat. Treatment at 36° C. for 5 days failed to cure either the tops or roots of potted plants, 36° for 7 days or 42° for 3 days cured the tops but not the roots, and 42° for 13 days or longer cured both tops and roots. Potato tubers with diameters up to ¾ in. were cured at 36° for 6 days. Potato, tomato, and *Vinca rosea* plants were benefited (but not cured) by summer greenhouse temperatures exceeding 97° F. for considerable periods during daylight hours, but not noticeably so by holding below 90°.)

The status of Septoria alopecuri, and some related species, R. Sprague. (Oreg. Expt. Sta. coop. U. S. D. A. and N. Dak. Expt. Sta.). (*Mycologia, 35 (1943), No. 3, pp. 259–263, illus. 1*).—The taxonomic history of *S. bromi alopecuri* Karst. on *Alopecurus pratensis* is discussed, and *S. andropogonis* f. *sporobolicola* n. f. on living leaves of *Sporobolus heterolepis* and *S. mississippiensis* n. sp. on living leaves of *Muhlenbergia mexicana* are described.

Ustilago striaeformis.—I, Germination of chlamydospores and culture of forma agrostidis on artificial media, K. W. Kreitlow. (U. S. D. A.). (*Phytopathology, 33 (1943), No. 8, pp. 707–712, illus. 1*).—A collection of *U. striaeformis* f. *agrostidis* whose chlamydospores germinated without an afterripening period is described. Those selected from the same sorus or from different sori on the same plant varied in germinability. When single-chlamydospore cultures of this race were grown on artificial media, development was strictly mycelial in form and could be differentiated into two biotypes.

A new nematode-capturing Dactylella and several related Hyphomycetes, C. Drechsler. (U. S. D. A.). (*Mycologia, 35 (1943), No. 3, pp. 339–362, illus. 4*).—New species described are *D. heterospora*, capturing and consuming *Plectus parvus* and other nematodes, *D. heptameres*, *D. rhopalota*, and *D. atractoides*, all on decaying leaves or leaf mold.

Studies on susceptibility of varieties and strains of barley to Fusarium and Helminthosporium kernel blight when tested under muslin tents or in nurseries, F. R. Immer and J. J. Christensen. (Minn. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 6, pp. 515–522*).—In 7 of 10 tests made in tents, a significant negative regression of *F. graminearum* (*Gibberella zeae*) and *H. sativum* blight on the date of heading was obtained. In the tents the susceptibility of a variety to blight was usually correlated with the data of heading. In 9 of 10 tests the strains differed significantly in reaction to these blight fungi after adjustment for date of heading. When the variation among strains tested for this reaction did not materially differ, there was no significantly differential response to these blight fungi in a tent or nursery. Selection for blight resistance in tents without consideration of date of heading would lead to selection of late-heading strains, not necessarily resistant to blight. In general, varieties resistant to *Fusarium* blight were also resistant to *Helminthosporium* blight.

Chlamydospore germination in the fungus causing dwarf bunt of wheat, C. S. HOLTON. (U. S. D. A. and Wash. Expt. Sta.). (*Phytopathology, 33 (1943), No. 8, pp. 732–735, illus. 1*).—Chlamydospores of the dwarf-bunt fungus (a race of *Tilletia tritici*) were induced to germinate by prolonged soaking (3 mo. or more) in tap water kept at about 4° C. Germination was relatively low—from a trace to about 30 percent in different collections. Most of the germinating spores produced a promycelium with two to four branches, and on these branches two to eight primary sporidia were borne, some fusing in pairs. A fused pair of sporidia usually produced a mycelium, which presumably was the infection hypha. Relatively few sickle-shape secondary sporidia were developed. The type of structures produced by the germinating spores may have some bearing on the classification of the dwarf-bunt fungus.

Colonies of Bacterium tabacum on roots of wheat and several grasses, S. DIACHUN, E. M. JOHNSON, and W. D. VALLEAU. (Ky. Expt. Sta.). (*Jour. Bact., 45 (1943), No. 6, p. 577*).—An abstract.

,Top rot of maize, sweet corn, and sorghum, W. V. LUDBROOK (*Jour. Council Sci. and Indus. Res. [Austral.], 15 (1942), No. 3, pp. 213–216*).—The symptoms of this soft rot are described as resembling those of sugarcane top rot. Various types of stunting or malformation of the tassel, upper leaves, and ear in corn are thought possibly to have a like origin. The disease was produced in the above three hosts by inoculating the stem apex with a bacterial organism isolated from spontaneously infected plants, and top rot of corn was also induced by inoculating with *Gibberella* spp. The bacterial pathogen differed from each of a number of bacterial species recorded as pathogenic to corn or sugarcane, or causing soft rot of plant tissues. It is partially described but has not yet been identified.

Rizoctoniose de alfafa, A. TOCCHETTO (*Sec. Estado, Negócios Agr. Indús. e Com. [Rio Grande do Sul] Cir. 51 (1942), pp. 3, illus. 1*).—An informatory leaflet on infection of alfalfa by *Rhizoctonia* sp.

An unusual bean disease, W. J. VIRGIN. (Idaho Expt. Sta.). (*Phytopathology, 33 (1943), No. 8, pp. 743–745, illus. 1*).—A new disease, observed on field and garden beans for seed, is characterized by a reddish nodal discoloration and a leaf malformation with definite reddening of the veins. Reddish sunken lesions may also occur on the pods, seeds from which may be severely marked with targetlike spots or concentric lines on the seed coats. Preliminary evidence indicates the disease to be due to a virus apparently closely related to bean virus 2. It is not seed borne.

A leaf disease of Kentucky bluegrass, R. B. GRIFFITH. (Ky. Expt. Sta.). (*Phytopathology, 33 (1943), No. 8, p. 745*).—It is reported that a leaf disease of *Poa pratensis* caused by *Septoria oudemansii* sometimes causes extensive yellowing of fields and lawns in cool, wet periods of spring and fall in central Kentucky.

Diseases of dent corn in the United States, A. J. ULLSTRUP. (Coop. Ind. Expt. Sta.). (*U. S. Dept. Agr. Cir. 674 (1943), pp. 34, illus. 22*).—All of the major and some of the more conspicuous minor corn diseases as they occur in the United States are discussed in semipopular form with respect to the factors affecting their development, description of symptoms, control measures, geographic distribution, and economic importance.

Histological studies of infections of the cotton hypocotyl by Glomerella gossypii and Fusarium moniliforme, T. J. HARROLD. (Univ. Ga.). (*Phytopathology, 33 (1943), No. 8, pp. 666–673, illus. 5*).—Infections of cotton seedlings, grown in Petri dishes, by *G. gossypii* or by *F. moniliforme* behaved similarly as regards penetration and course of growth within the host. Both fungi are evidently intracellular parasites which eventually kill the host cells. The greater tendency to survival after infection by *F. moniliforme* may possibly be due to the stimulation of lateral root production.

"Pasmo" disease of flax, J. Colhoun and A. E. Muskett (*Nature [London], 151 (1943), No. 3825, pp. 223–224, illus. 2*).—A culture of a fungus isolated from flax in Kenya and believed to be *Sphaerella linorum* was received and its identity confirmed by inoculations in Belfast. As pasmo has not yet been reported in the United Kingdom, a warning is given.

Chemical seed treatments for the control of certain diseases of sorghum, R. W. Leukel (*U. S. Dept. Agr., Tech. Bul. 849 (1943), pp. 24, illus. 2*).—To determine their effect on emergence and on smut control, 19 materials were tried as disinfectants for sorghum seed (1937–41). In severely infested soil in the greenhouse, dust fungicides usually were most effective in improving emergence when applied at an excess rate, although they were also beneficial at the recommended rate. In less severely infested greenhouse soil and in field plats, however, benefits to emergence from the heavier dust applications were no greater than when used at recommended rates. In soil heavily infested with *Pythium* spp., dust disinfectants, even in excess, were relatively ineffective in improving emergence at 15° C. and also, to a great extent, at 20°. In greenhouse soil infested with *Fusarium* spp., improvement in emergence as a result of seed treatment with the more effective dust fungicides was usually slight at 15° and very pronounced at 20° and 25°, especially when the excess rate was used. Following treatment with nine dust fungicides (six mercury and three copper compounds), the average improvement in emergence of seed of nine varieties planted on four dates ranged from 11.6 percent for New Improved Semesan Jr. to 39.5 percent for copper carbonate and averaged 26.4 percent for the fungicides used. All of these were applied at a rate of 2 oz. per bushel.

Disappearance of virus from mosaic-diseased sugarcane plants, I. L. Forbes and P. J. Mills (*Phytopathology, 33 (1943), No. 8, pp. 713–718*).—Certain sugarcane varieties apparently recover from mosaic in Louisiana and manifest no further symptoms. Disease-free shoots also very commonly develop from seed cane known to be mosaicked. A large series of tests over many years was conducted to determine whether recovered plants or shoots from mosaicked seed cane carried the virus and whether they could be subsequently infected. Healthy cane inoculated with juice from these symptomless plants that had recovered or developed from diseased seed cane failed to develop mosaic, though control plants inoculated at the same time with virus from affected cane showed a high percentage of mosaic. Tests also indicated that mosaic would again develop on such symptomless plants when they were inoculated with an active virus obtained from plants exhibiting the symptoms.

Nuevas observaciones sobre el "carbon" en las distintas variedades de caña de azucar [New observations on smut in the different varieties of sugarcane], W. E. Cross (*Bol. Estac. Expt. Agr. Tucuman, No. 39 (1943), pp. 15*).—Varietal tests with respect to the disease are tabulated and discussed.

Growth relationships as affecting root rotting and premature death of sweet clover, J. M. Slatensek and E. A. Hollowell. (Nebr. Expt. Sta. coop. U. S. D. A.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 6, pp. 523–531, illus. 4*).—Severe outbreaks of a hitherto unexplained root and crown rot are reported to have occurred annually since 1938 in populations of widely spaced plants in the breeding nurseries at the Nebraska Station, mortality amounting to about 60 percent of the second-year plants and with most of the remaining plants showing varied degrees of abnormality. Wilting and yellowing is usually followed by death, and the roots are overgrown and soft and contain necrotic areas. Initial rotting occurs in the crown and upper part of the root. Studies of the effect of controlled growth indicated the condition to result from excessive first-year growth. Restricting growth by any means to approximate that in farm stands resulted in plants free from root and crown rot, whereas widely spaced plants allowed to develop to a size corresponding to that of the large, regularly grown nursery plants were severely root- and crown-rotted. Anatomical examination of normal and abnormal roots indicated the latter to be comprised of more and larger-sized cells. Furthermore, the cell walls of the overgrown roots appeared to be thinner than those of the smaller normal ones. The disease was controlled by growing the nursery plants so as not to develop excessively during the first year. In 1941–42 this was accomplished by starting widely spaced plants in late spring and transplanting in late June and early July.

A tendency to escape tobacco-mosaic disease in derivatives from a hybrid tomato, F. O. Holmes (*Phytopathology, 33 (1943), No. 8, pp. 691–697, illus. 1*).—In the Chilean tomato (*Lycopersicon chilense*) and in certain derivatives from its hybrid with the cultivated tomato, a heritable characteristic of klendusity with respect to the abrasive and pruning types of inoculation with tobacco-mosaic virus is reported. Whether this tendency to escape disease can be transferred to and incorporated in ordinary tomato varieties, and without interfering with quality or yield of fruits, remains to be shown.

Tobacco streak, G. H. Berkeley and J. H. H. Phillips (*Canad. Jour. Res., 21 (1943), No. 6, Sect. C, pp. 181–190, illus. 11*).—The symptoms of this virus disease, consisting mainly of ring spotting and systemic necrosis, are described in detail for six species of *Nicotiana* (including common tobacco), tomato, *Nicandra physalodes, Datura stramonium, Antirrhinum majus, Calendula officinalis,* and *Phaseolus vulgaris humilis.* Attempts at transmission to *Physalis angulata, Phytolacca americana, Capsicum frutescens, Nicotiana glauca, Callistephus chinensis, Petunia hybrida,* and *Sinningia speciosa* were unsuccessful. The incubation period was 6–14 and 4–10 days, respectively, on transmission by the patch-grafting and juice transfer methods. The virus was inactivated in juice extracts at 53° C. for 10 min. and in patch sticks at 55° for 5 min., but not in patch sticks at 50° for 15 min. According to experimental evidence it does not overwinter in the soil in Ontario and little if any mechanical spread occurs under field conditions. Circumstantial evidence suggested that in the field the virus may spread from sweetclover to tobacco, and this was supported experimentally in that streak was transferred from sweetclover to tobacco and a disease resembling streak was transmitted from tobacco to sweetclover.

Root rots in storage of deciduous nursery stock and their control, G. Y. Young. (U. S. D. A. et al.). (*Phytopathology, 33 (1943), No. 8, pp. 656–665, illus. 1*).—Through observations on the rather heavy losses of nursery seedling stock at three nurseries in the Upper Mississippi Valley it was found that practices which might lead to injury if carried out under subfreezing temperatures include lifting of stock, leaving undercut stock in loosened ground, transporting or other outdoor handling of unprotected stock, storing plants in outdoor heel-in beds without adequate protection to the roots from low temperatures, and storing plants indoors in poorly insulated structures. In storage, plants thus injured were found invaded by numerous fungi the most common of which were species of *Fusarium* and *Alternaria.* Adherence to tentative recommendations formulated as a result of this work has reduced storage losses to a negligible figure in nurseries where there had previously been frequent losses. As far as practicable deciduous nursery stock should be lifted and handled when the temperature is above freezing, particularly with black locust, Siberian elm, Osage-orange, black walnut, Russian mulberry, and tulip tree. Green ash and Siberian pea tree are more resistant.

For outdoor storage in northern nurseries, deep heeling-in is important, and loamy soils with rotation of site are preferred. Storage facilities such as packing sheds, root cellars, and caves, where temperature fluctuations are controlled within narrow limits above freezing and where a high relative humidity is maintained, appear to be safe for most deciduous nursery stock. Care should be exercised in lifting and handling nursery stock so as to avoid root injuries, and all plants showing severe mechanical injuries to the roots or lesions, molds, and other types of root infection should be discarded. When nursery stock, especially of the frost-susceptible species, is shipped in bales or crates, it should not be placed outdoors or in unheated buildings during freezing weather, nor should planting operations be done in such weather.

Stem blight of the castor bean, I. Reichert (*Palestine Jour. Bot., 3 (1940), No. 1-2, R Ser., pp. 269-272, illus. 1*).—This is a note on the dying of *Ricinus communis* plants from stems and roots of which a *Fusarium* identified as *F. orthoceras* was isolated, and from the roots both this species and one identified as *F. semitectum*. The castor-beans were growing under subtropical conditions about 200 ft. below sea level in the Jordan Valley.

Tomato diseases, S. P. Doolittle (*U. S. Dept. Agr., Farmers' Bul. 1934 (1943), pp. 83+, illus. 48*).—This handbook considers tomato diseases due to bacteria, fungi, viruses, insects, and nematodes, as well as nonparasitic diseases and two (fruit pox and ghost spot) of undetermined cause, along with specific recommendations for control. A section also deals with general methods of disease control, and a key to tomato diseases is provided.

A technique to compare virulence of isolates of Alternaria solani on tomato leaflets, F. L. Wellman. (U. S. D. A.). (*Phytopathology, 33 (1943), No. 8, pp. 698-706, illus. 1*).—According to this laboratory technic, leaflets attached to tomato seedlings about a month old and grown under standard conditions are selected for the virulence tests. Cultures of the pathogen are grown on agar under standard conditions and standardized pieces of the cultures used for inoculum. The course of symptoms of attack is studied under controlled conditions of incubation and compared with field observations. Progressive symptoms on diseased leaflets are classified according to numerical grades and these numbers used as virulence values. Controlled inoculation studies are made and data compared statistically. The reactions were found to be reasonably consistent from one test to the next, and the relative virulence was expressed on a numerical basis.

A nonchromogenic sporulating variant of Alternaria solani, H. R. Thomas. (Ind. Expt. Sta. coop. U. S. D. A.). (*Phytopathology, 33 (1943), No. 8, pp. 729-731, illus. 1*).—As commonly isolated from tomatoes, *A. solani* forms a yellowish to deep-red pigmentation on potato dextrose agar and sporulates only sparingly. A variant culture failing to color agar but sporulating profusely came from a single-spore culture isolated from an early blight lesion on a tomato leaf. This culture, which is actively pathogenic on tomato foliage and induces typical lesions, has proved very useful in work where large numbers of spores are desired or where an easily identified strain is required for field experiments.

Molybdenum injury of tomato plants, D. L. Elze (*Palestine Jour. Bot., 3 (1940), No. 1-2, R Ser., pp. 154-157, illus. 4*).—Two experiments with potted tomatoes appeared to indicate the tolerance for molybdenum to lie between 6.8 and 13.5 mg. per plant.

A heart-rot of apple trees caused by Diplodia sp., J. Perlberger (*Palestine Jour. Bot., 3 (1940), No. 1-2, R Ser., pp. 263-265, illus. 1*).—A note on the occurrence of this heart rot on apple as well as citrus in Palestine.

Anatomical and other studies on mazzard cherry seedlings having excessive roots at the collar region, E. A. Siegler. (U. S. D. A.). (*Jour. Agr. Res.* [*U. S.*], *67* (*1943*), *No. 1, pp. 1–16, illus. 9*).—In the course of studies of nursery cherry trees to determine the nature of malformations characterized by excessive rooting of mazzard seedling rootstocks just below the ground line, infections were obtained from inoculations with the hairy root organism (*Phytomonas rhizogenes*), but the symptoms were not typical of the malformations under investigation. Anatomical studies, however, demonstrated the presence of root primordia in the hypocotyl of young seedlings in sufficient numbers to account for the tufts of roots occurring on some nursery trees. The origin and development of these primordia are described; their points of origin indicate their presence to be a normal occurrence in many seedlings.

Organic materials in pre-harvest sprays for cherries, D. H. Palmiter and J. M. Hamilton. (N. Y. State Expt. Sta.). (*Phytopathology, 33* (*1943*), *No. 8, pp. 683–690, illus. 2*).—When sprayed on cellulose-nitrate-coated glass slides, Fermate and Jap Beetle Spray were equally toxic to *Sclerotinia fructicola* spores and exhibited two to three times greater toxicity than micronized sulfur or red copper oxide, which have been used against brown rot on sweet cherries. Washing the sprayed slides before applying the spores indicated a greater retention of Fermate and red copper oxide over Jap Beetle Spray or sulfur. Addition of soluble cottonseed oil markedly increased the amount of toxic residue retained by Jap Beetle Spray and sulfur-sprayed slides. Fermate and Jap Beetle Spray proved superior to Spergon and micronized sulfur when tested as preharvest sprays on sweet cherries for control of brown rot and gray mold. Fermate and Jap Beetle Spray should be used at 1–100, which should also give appreciable leaf spot control. These materials at ½–100 have been used with success when more than one application is made or when applied during the harvest period. Moist-chamber studies and market observations showed that Fermate as a preharvest spray enhances the keeping quality of the cherries on the fresh fruit market more than any of the other materials tested. Fermate to which a good spreader has been added avoids the visible residue from sulfur sprays on dark-colored cherries, but this dark spray material shows more than Jap Beetle Spray or sulfur on light-colored fruit. An emulsified vegetable oil proved a desirable addition to the preharvest spray from the standpoints of rendering the residue less visible and of reducing the amount of cracking.

Gouirand and Bergeron's treatment of Sphaceloma ampelinum, A. E. Jenkins and A. A. Bitancourt. (U. S. D. A. et al.). (*Mycologia, 35* (*1943*), *No. 3, pp. 272–276, illus. 1*).—The graphic account of the grape anthracnose fungus *S. ampelinum* published in 1897 by Gouirand and Bergeron (E. S. R., 9, p. 961), is discussed, and the original illustrations are reproduced with full legends to increase their availability and make clearer an understanding of certain aspects of the life history of the fungus, particularly with respect to conidial formation.

Mosaic spots of fig fruits, I. J. Condit and W. T. Horne. (Calif. Citrus Expt. Sta.). (*Phytopathology, 33* (*1943*), *No. 8, pp. 719–723, illus. 2*).—Spots observed on profichi of the Samson caprifig and in some caprifig seedlings are described as round, crescent-shaped or in rings, watery, becoming brownish and finally necrotic. Affected fruits usually fall. Somewhat comparable spots also occur on edible figs. The parenchyma is abnormal, but no organisms were observed in sections or cultures and attempts to transmit fig mosaic to tomato and *Nicotiana glauca* failed.

Market diseases of fruits and vegetables: Citrus and other subtropical fruits, D. H. Rose, C. Brooks, C. O. Bratley, and J. R. Winston (*U. S. Dept.*

Agr., Misc. Pub. 498 (1943), pp. 57, illus. 20).—This is the eighth (E. S. R., 86, p. 796) in a series designed to aid in recognizing and identifying economically important pathological conditions in the channels of marketing, to facilitate the market inspection of these food products, and to prevent losses from such conditions. Of the 20 plates, 16 are in color. There are 146 references.

Control of Pythium root rot of Aloe variegata by hot-water treatment, K. F. Baker and K. Cummings. (Univ. Calif.). (*Phytopathology, 33 (1943), No. 8, pp. 736–738, illus. 1*).—*P. ultimum* is said to cause an important root rot of young nursery plants of *A. variegata* in California. A hot-water treatment at 46° C. for 20–40 min., depending on plant size, was found to kill the parasite without injury to the host. It is essential that treated material be replanted in soil free of the pathogen.

Phytophthora infections of citrus and their control, L. J. Klotz (*Calif. Citrog., 28 (1943), No. 8, pp. 200–201, 220–221, illus. 6*).—An address summarizing pertinent knowledge of the subject and with particular reference to studies by the author and his associates.

Early diagnosis of Jaffa orange blemishes and diseases by means of ultraviolet rays, G. Minz (*Palestine Jour. Bot., 3 (1940), No. 1–2, R Ser., pp. 259–262*).—Jaffa oranges in Palestine suffer heavy losses in storage and transit from fruit rots, particularly by *Penicillium* sp. and *Diplodia* sp. In this study, ultraviolet rays detected either mold or stem-end rot only after the infected part had begun to soften and not during the incubation period. However, they may serve to detect wounds and blemishes invisible to the naked eye, as well as pox and hail spots. The distinct fluorescence of injured, blemished, or diseased fruit is believed due to the ethereal oil secreted by the oil glands in the peel.

Study of Bagnisiopsis species on the Melastomaceae, J. H. Miller and M. G. Burton. (Univ. Ga.). (*Mycologia, 35 (1943), No. 3, pp. 312–334, illus. 23*).—The genus *Bagnisiopsis* comprises a group of fungi occurring on living leaves of various genera and species of the Melastomaceae in tropical America. The members parasitizing this plant family have been placed in the section *Eubagnisiopsis*, and this paper is confined to a taxonomic study of that section. New nomenclature is involved in three of the eight species studied. A key to the species and a host index are provided.

Breaking in color of flowers of annual phlox caused by the aster-yellows virus, H. H. P. Severin. (Calif. Expt. Sta.). (*Phytopathology, 33 (1943), No. 8, pp. 741–743, illus. 1*).—*Phlox drummondii* was shown to be spontaneously infected and was also experimentally infected with the California aster yellows virus via previously noninfective and infective short-winged and long-winged aster leafhoppers, *Macrosteles divisus*. The symptoms were color breaking in the petals, proliferation, and greening of the flowers.

Two new species of Didymopsora from India, M. J. Thirumalachar (*Indian Acad. Sci. Proc., 16 (1942), No. 6, Sect. B, pp. 165–174, illus. 11*).—The two rust fungi described are *D. toddaliae* n. sp. on *Toddalia aculeata gracilis* and *D. macrospora* n. sp. on *T. aculeata floribunda*.

Powdery mildew on ribbon-bush (Homalocladium platycladum Bailey), A. W. Dimock. (Cornell Univ.). (*Phytopathology, 33 (1943), No. 8, pp. 745–746, illus. 1*).—An *Erysiphe*, presumably *E. polygoni*, is reported for the first time on ribbonbush, a member of the Polygonaceae native to the Solomon Islands. Vegetative mycelium and perithecia were abundant on the true leaves, but infection did not develop on the phyllodia.

Dutch elm disease and its control, J. M. Walter, C. May, and C. W. Collins (*U. S. Dept. Agr. Cir. 677 (1943), pp. 12, illus. 12*).—This circular was prepared primarily to furnish owners and managers of elm-concealed factories, estates, and valuable installations with the necessary information concerning the disease (*Ceratostomella ulmi*) and its insect vectors. In addition to data on the symptoms, cause, transmission, and control, information is presented on the reactions of important elm species and varieties and on the recovery of a porton of the trees that become infected.

Gyroceras celtidis (Biv.-Bernh) Mont. et Ces. on leaves of Celtis, M. Chorin (*Palestine Jour. Bot., 3 (1940), No. 1–2, R Ser., pp. 265–267, illus. 1*).—A note on this fungus leaf spot disease of *C. australis* and *C. orientalis* in Palestine.

Causes of hemlock mortality in northern Michigan, S. A. Graham (*Mich. Univ., School Forestry and Conserv. Bul. 10 (1943), pp. 63, illus. 19*).—Hemlock mortality since 1932 having been excessive in northern Michigan, the author sought by this study to determine the cause. Observations and experiments with the hemlock borer *Melanophila fulvoguttata* indicated that it can live successfully only in dying trees. Neither rate of diameter increment nor classification of trees according to the usual crown classes based on position with reference to other tree crowns exhibited any recognizable role, but a clear relationship was found between the amount and direction of exposure to sunlight and the death rate, the greatest mortality occurring in trees exposed to the southwest. Trees with conical tops and wide or long crowns were least injured, whereas those with flat or rounded tops and short or narrow crowns were, under conditions obtaining since 1930, almost certain to die on exposure. Similar relationships were found for yellow birch. From the standpoint of the residual stand, it is thus deemed safe to cut any trees to the north, northeast, or northwest of hemlocks or birches.

Role of Dasyscypha willkommii and related fungi in the production of canker and die-back of larches, G. G. Hahn and T. T. Ayers. (U. S. D. A. et al.). (*Jour. Forestry, 41 (1943), No. 7, pp. 483–495, illus. 3*).—The European larch-canker parasite (*D. willkommii*) and fungi closely related to and associated with it have been studied in Europe for over half a century. Nevertheless, at the time of its discovery in Massachusetts in 1927 its identity was imperfectly understood, and because of this both its morphology and pathology needed further study. For control purposes it became necessary to distinguish the introduced parasite from related fungi, including native species, and the determination of its true host range also became extremely important. The authors' studies are believed not only to have settled its identity, but also to have demonstrated that the parasite attacks only species of larch and not the economically important Douglas fir and ponderosa pine. This paper presents experimental data showing that the larch canker organism, and not related fungi, is capable of infecting both native and introduced species of *Larix* and of producing cankers and dieback in the absence of frost injury.

A Dasyscypha following Cronartium ribicola on Pinus monticola, II, R. T. Bingham and J. Ehrlich. (Idaho Expt. Sta.). (*Mycologia, 35 (1943), No. 3, pp. 294–311, illus. 2*).—In continuation of the series previously noted (E. S. R., 89, p. 235), studies of a small-spored, white-excipled *Dasyscypha*, frequently found associated with blister rust cankers on *P. monticola* in the northwestern United States and in the past confused with *D. agassizii* and *D. calyciformis*, indicated it to be distinct from these two species. Since it was not possible to compare large numbers of collections of the three fungi on various hosts, this *Dasyscypha* is not proposed as a new species.

ECONOMIC ZOOLOGY—ENTOMOLOGY

The influence of flood and low water levels on the survival of muskrats, F. C. Bellrose, Jr., and J. B. Low. (Ill. Nat. Hist. Survey). (*Jour. Mammal., 24 (1943), No. 2 pp. 173–188, illus. 3*).—It was found that a rise of 5 to 7 ft. of water during flood stage disrupted and reduced muskrat populations in certain areas of the Illinois River Valley in 1941. Exceptionally favorable environmental conditions prior to high water early in October had resulted in higher, better situated populations than usual.

The domestic rabbit, L. Stevenson (*Ontario Dept. Agr. Bul. 434 (1943), pp. 23, illus. 4*).—General information on the production of rabbits for meat and skins, with reference to likely diseases and parasites.

Raccoons: Their habits and management in Michigan, F. W. Stuewer. (Mich. State Col. et al.). (*Ecol. Monog., 13 (1943), No. 2, pp. 203–257, illus. 55*).—Presented with a list 63 references to the literature cited.

A population study of the Beechey ground squirrel in central California, F. C. Evans and R. Holdenried. (Univ. Calif. et al.). (*Jour. Mammal., 24 (1943), No. 2, pp. 231–260, illus. 8*).—This contribution deals with a population of the common economic species *Citellus beecheyi*. This ground squirrel, the chief rodent pest of California, is said to destroy annually many thousands of dollars worth of crops and to serve as a reservoir for diseases, notably plague and tularemia. In 1941 an estimated $400,000 was spent for its control within that State.

Food habits of foxes in wild turkey territory, E. L. Kazicky. (Pa. Expt. Sta. et al.). (*Pa. Game News, 14 (1943), No. 4, pp. 8–9, 28, illus. 3*).

Birds of North Carolina, T. G. Pearson and C. S. and H. H. Brimley (*Raleigh: N. C. Dept. Agr., 1942,* [*rev.*], *pp. 416+, illus. 184*).—This entirely rewritten edition of the work published in 1919 (E. S. R., 42, p. 847) gives detailed descriptions of the appearance and habits of the birds that occur in North Carolina, of which some 396 species and subspecies representing 63 families are recognized, together with 37 colored plates and other text illustrations by R. Brasher, R. B. Horsfall, and R. T. Peterson. New material accumulated since the publication of the first edition is included, the bibliography having been increased to 22 pages. Notes on bird migration at Raleigh from 1885 to 1941, including summer visitors, winter visitors, transients, and stragglers, by C. S. Brimley (pp. 401–406), and on bird banding, by H. T. Davis (p. 406), are included.

Development of a bob-white management area in southern Iowa, E. Sanders (*Iowa Sta. Res. Bul. 317 (1943), pp. 697–726, illus. 2*).—The results are reported of work on an experimental bobwhite management area, which was divided into two parts, the northern having been designated as the pay-shooting area, for which farmers were permitted to charge $1 per man-day for hunting privileges, and the southern as a free-shooting area, where no charge for hunting was permitted, the farmers being paid 10 ct. per acre by the Iowa State Conservation Commission in 1936 and 1937. Designated game management practices in 1936 included: (1) Planting sorghum and Korean lespedeza; (2) setting out trees; (3) fencing an eroding ditch or a feeding station; and (4) constructing a feeding station. In 1937, the stipulated practices were growing a food patch and fencing a gully. The materials, except fence posts, for these practices were furnished the farmers without cost. Part of the designated game management practices was performed by 100 percent of both owner and tenant operators in the south area and by 75 percent of the owner operators and 67 percent of the tenant operators in the north area in 1936. The cost for performing these game management practices, including materials and the acreage fee, was 13 ct. an acre for the south area and 3 ct. for the north area in 1936, and less in 1937 because less materials were furnished. Little difference was noted between the amount and effectiveness of game management practiced by owner and tenant operators. In the winter of 1939–40, 20 farmers (10 owners and 10 tenants) fed quail, and only 2 had fed them during the winter of 1936–37.

During the period of the investigation three winters and one summer offered adverse conditions for bobwhite survival and production. In contrast to the unfavorable seasons, two consecutive summers and two winters were exceptionally favorable for bobwhite. The three severe winters caused calculated losses of 88, 75, and 55 percent of the quail. The lowest calculated population density for the area was one bird to 85.7 acres, and the highest was one bird to 3.3 acres, a population built up during three consecutive rearing seasons. The highest calculated percentage rate of recovery was 457 percent, which occurred during the season when the breeding population was the lowest, and the lowest percentage rate of recovery was 84 percent when the breeding population was the highest. Hunting of quail was permitted in the season of 1936 and again in 1939. The farmers allowed very little hunting in 1936, and 211 birds were reported taken by hunters in 1939. As far as is known no hunter on either area was charged for the privilege of hunting.

The Hungarian partridge (Perdix perdix Linn) in the Palouse Region, Washington, C. F. Yocom. (Wash. State Col.). (*Ecol. Monog., 13* (*1943*), *No. 2, pp. 167–201, illus. 17*).—This study is presented with a list of 36 references to the literature cited.

The ivory-billed woodpecker, J. T. Tanner (*Natl. Audubon Soc., Res. Rpt. 1* (*1942*), *pp. 111+, illus. 43*).—This work reports the results of an intensive study of *Campephilus principalis* for the 3 yr. 1937–39. Its habitat outside of Florida is the bottomland forests where sweet gum and oaks predominate, and in and near Florida it is in cypress swamps and swampy hammocks. The investigation was conducted with a view to gathering knowledge needed to plan a conservation program for this vanishing species. About two-thirds of the time was spent in the present and former range of the bird in the southeastern United States, observing it in the field and investigating its habitat. Information contained in the literature was examined for additional records and observations.

Diminution of the ivory-bill's range has coincided with the spread of the logging industry, and the birds have disappeared as the timber in the swampy forests was cut. At least 49 different localities throughout the Southeastern and South Central States were investigated for the possible present-day occurrence of ivory-bills. About 5 areas in Louisiana, Florida, and possibly South Carolina were found to be inhabited by the woodpeckers or to have evidence of their presence. The total population of the birds was estimated in 1939 to be around 24 individuals. When the food supply is sufficient, the woodpecker is probably resident or sedentary, with a feeding range from 3 to 4 miles across. There is considerable evidence that pairs or individuals sometimes move long distances in search of forests supplying an adequate quantity of food.

The primary food of this woodpecker consists of wood-boring insect larvae, "particularly larval cerambycids, buprestids, and elaterids that live between the bark and the sapwood of recently dead trees. In the Mississippi Delta the woodpecker secures most of its food from the larger sweet gum, Nuttall's oak, and hackberry trees. It also feeds upon fruits, nuts, seeds, and similar vegetable material on occasion. The ivory-bill is present only in forests where dead and dying trees are frequent and other woodpeckers are abundant, conditions which normally prevail only in tracts of uncut, mature timber. Studies made in the Singer Tract, Louisiana, together with several recorded incidents, indicate that the ranges and numbers of individuals have been affected by the abundance of food, birds inhabiting only those areas supplying a large amount of food. The kinds of borers eaten primarily by ivory-bills were found to be much less abundant in the forest than the kinds eaten largely or entirely by pileated woodpeckers, a similar but common and widespread species, and furthermore these borers are likely to be sporadically distributed and to fluctuate considerably in numbers from year to year. Competitors or predators apparently do not seriously affect the ivory-bill in any way."

A three-page list of references to the literature cited and an index are included.

Entomological problems imposed by war conditions, P. N. Annand. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 193–200*).

Undercooling and freezing of insects, L. P. Ditman, G. B. Voght, and D. R. Smith. (Md. Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 304–311, illus. 4*).—In this second of a series of reports on cold resistance in insects the experiments were primarily devoted to comparing various technics for determining undercooling and freezing points of the species used in unfreezable water studies previously noted (E. S. R., 87, p. 821). A comparison of types of apparatus for determining undercooling and freezing points of insects as described by Robinson (E. S. R., 60, p. 750) and Salt (E. S. R., 77, p. 213) and by Seigler as modified by Ditman et al. (E. S R., 83, p. 371) was made under refrigeration temperatures ranging from −8° to −70° C. At a minimum low temperature all types of apparatus gave fairly accurate results, but as refrigeration temperatures were reduced the three types of holders behaved differently because of differences in heat conductivity, specific heat, and density and because of the location of the thermocouple with regard to source of refrigeration. With the type of holder described by Robinson, observed undercooling points were higher as refrigeration temperatures were lowered. With the cork-and-wool holder of Ditman and Weiland, observed undercooling points varied directly with refrigeration temperatures. With the rubber holder of Salt, observed undercooling points were not greatly influenced by refrigerator temperatures. The extent of the rebound is also influenced by different types of holders. It was greatest with the cork-and-wool holder and least with the rubber holder. Accurate observed undercooling and freezing points cannot be determined in the same operation by the use of present methods. Undercooling appears to be a physical condition brought about by the reduction and distribution of water in the insect in which it is suggested that materials colloidal in nature play a part. Both undercooling and freezing points are influenced by reduction of body water.

[Notes on economic insects and insect control] (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 326–354, illus. 4*).—Contributions presented (E. S. R., 89, p. 337) are: Shade Tree Insects and Protective Concealment in Military Areas, by E. P. Felt and S. W. Bromley (pp. 326–327) ; Host Plants of the Banded Greenhouse Thrips, by P. M. Eide (pp. 327–328), A Comparison of Methods for the Fumigation of Empty Banana Refrigerator Cars With Liquid Hydrocyanic Acid, by H. C. Donohoe (pp. 328–329), Styrene Dibromide as a Substitute for Pyrethrum in Oil for Corn Earworm Control, by G. W. Barber (pp. 330–332), Cryolite Injury to Tobacco Seedlings, by L. B. Scott and J. Milam (p. 335), Tests Using 1,1–Dichloro–1–Nitroethane Against Wireworms, by C. E. Woodworth (pp. 335–336), Tests of Mississippi Bentonites in Tank-Mix Nicotine Bentonite Sprays for Control of the Codling Moth, by L. F. Steiner, C. H. Arnold, and J. E. Fahey (pp. 338–339), Apparent Control of the Pacific Mite With Xanthone, by E. J. Newcomer (pp. 344–345), An Exudation Associated With the Feeding Location of the California Red Scale, by H. R. Yust and R. A. Fulton (pp. 346–347), Influence of Inbreeding on the Susceptibility of the California Red Scale to HCN, by H. R. Yust, H. D. Nelson, and R. L. Busbey (pp. 352–353), and Sodium Fluosilicate to Control Poultry Lice, by H. E. Parish (pp. 353–354) (all U. S. D. A.); The Relationship Between Cropping Practices and Injury by *Heliothis armigera* With Especial Reference to Lima Beans and Tomatoes, by B. B. Pepper (pp. 329–330), and Performance of American Foulbrood Resistant Strain of Honeybees in New Jersey, by R. S. Filmer (pp. 339–341) (both N. J. Expt. Stas.); Utah Bird Predators of the False Chinch Bug, by G. F. Knowlton and S. L. Wood (pp. 332–333), and Three New Pests [Brown-Banded Roach, *Ptinus latro* F., and *Zabrotes subfasciatus* Boh.] Invade Utah, by G. F. Knowlton (p. 353) (both Utah Sta.); *Sagaritis provancheri* (D. T.), an Important Parasite of the Tobacco Budworm, by G. Wene (pp. 333–334) (Va. Sta.); The Say Stinkbug on Potatoes in Montana, by D. J. Pletsch (pp. 334–335) (Mont. Sta.): The Larva of *Culex abominator* Dyar & Knab, by R. B. Eads (pp. 336–338); Attraction of *Melanophila* Beetles by Fire and Smoke (p. 341) and Delayed Emergence of *Buprestis aurulenta* [Linn.] From Structural Timbers (pp. 348–349), both by E. G. Linsley, and Surface Area of Persian Walnuts, by J. W. Hansen (p. 347) (all Univ. Calif.); Control of Aphids and Diamond-Back Moth Larvae on Collards With Rotenone-Nicotine Dusts, by H. G. Walker and L D. Anderson (pp. 343–344) (Va. Truck Sta.); Plant Stimulation Aids in Control of *Pissodes nemorensis* on *Cedrus deodara*, by W. C. Nettles (p. 345) (Clemson Agr. Col.); Life History of the European Chafer *Amphimallon majalis* (Razoum), by H. H. Schwardt and W. H. Whitcomb (pp. 345–346), and The Yam Bean, *Pachyrrhizus erosus* Urban, as a Possible Insecticide, by R. Hansberry and C. Lee (pp. 351–352) (both Cornell Univ.); Rearing Southern Corn Rootworms on Seedling Corn Plants, by J. H. Bigger and R. B. March (pp. 349–350) (Ill. Nat. Hist. Survey); Orchard Dusting Experiments With Natural Cryolite for Codling Moth, by I. D. Dobroscky (pp. 350–351); *Ptinus tectus* Damaging Furs in Alaska, by M. H. Hatch (p. 353); Airplane Runways Damaged by Ants [*Pogonomyrmex barbatus molefaciens* (Buckley)], by W. M. Gordon (p. 354); and Accidental Transportation of Mosquitoes by Automobile, by D. E. Eyles (p. 354).

The twelfth or 1942 annual insect population summary of Kansas, R. C. Smith and E. G. Kelly. (Kans. Expt. Sta.). (*Jour. Kans. Ent. Soc., 16 (1943), No. 3, pp. 99–116, illus. 1*).—This continues the series (E. S. R., 89, p. 338).

Insects of Guam, I (*Bernice P. Bishop Mus. Bul. 172 (1942), pp. 218+, illus. 20*).—The final sentence of the abstract of this publication (E. S. R., 88, p. 218) should read as follows: "The list includes 361 species from Guam, about a quarter of which are described as new and some 300 not known from Hawaii."

Entomological investigations (*Austral. Council Sci. and Indus. Res. Ann. Rpt., 16 (1942), pp. 14–21*).—Particular mention is made of work with insect pests of stored wheat and wool; insect control of noxious weeds; sheep blowfly; fly, mosquito, and flea control; cattle tick *Boophilus australis;* sheep louse; Australian plague locust *Chortoicetes terminifera;* red-legged earth mite *Halotydeus destructor;* oriental peach moth; biological control of insect pests; insect vectors of plant virus diseases; and the potato tuber worm.

Controlling insects in the home vegetable garden, B. B. Pepper (*New Jersey Stas. Cir. 459 (1943), pp. 16*).—A practical account, reprinted with revisions from circular 445 (E. S. R., 88, p. 784).

Studies of reduced schedules for control of apple insects in Connecticut, P. Garman. (Conn. [New Haven] Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 211–214*).—It has been found in tests on glass slides in the laboratory, utilizing the settling tower and washing in distilled water, that both silica and alumina gels have good adhesive properties. Furthermore, lime added to talc and certain other materials may increase the adhesiveness of the mixture. Complete mixtures containing sulfur as the fungicide may still have good adhesion when combined with alumina gel. Field tests in 1941 and 1942 indicated the value of aluminum acetoborate or aluminum acetoformate, oil, and benzoic acid (probably forming alumina gels) as stickers and that such mixtures have a definite corrective or "safening" value for arsenate of lead. This is reflected in both reduced drop and fruit russet. The important problem of introducing a satisfactory fungicide into the special mixtures is still unsolved. Orchard experiments with lime-sulfur, soybean flour, and manganese borate have also given interesting results. The combination produced good quality fruit relatively free of russet in at least two different Connecticut orchards.

The citrus pests investigation in the Windward and Leeward Islands, British West Indies, 1937–1942, R. G. Fennah (*Trinidad, B. W. I.: Imp. Col. Trop. Agr., 1942, pp. 66+, illus. 9*).—Report is made of the results of an investigation of citrus pests in these islands, extending over 5 yr. commenced in April 1937. Particular attention is given to the citrus weevils of the genus *Diaprepes* and scale insects.

Insects infesting house plants.—III, Thrips and red spiders, E. I. McDaniel (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 303–304*).—A continuation of this account (E. S. R., 88, p. 784).

Insects affecting stored food products, E. G. Linsley and A. E. Michelbacher (*California Sta. Bul. 676 (1943), pp. 44, illus. 21*).—A practical account which includes information on the more common insects found in stored food, sources and means of infestation, general control measures, and biological habits.

Survey of tobacco carriers for stored-tobacco insects, L. W. Brannon and W. D. Reed. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 295–299, illus. 4*).—A survey made at the Hampton Roads ports of Norfolk and Newport News, Va., from October 1 to December 31, 1939, with a view to determining the importance of tobacco carriers, including ships, railway cars, and motor trucks, in disseminating stored-tobacco insects, principally the tobacco moth and the cigarette beetle, is reported upon.

[Contributions on insecticides and insect control] (*6. Pacific Sci. Cong., Calif., 1939, Proc., vol. 6, pp. 113–128, 135–166, 177–183, 205–227, illus. 13*).—Contributions presented at the sixth congress of this association held at Berkeley, Stanford University, and San Francisco, July 24 to August 12, 1939, relating to insect control, include the following: Problems Relating to Spray Residue, by R. H. Robinson (pp. 113–118) (Oreg. Expt. Sta.); Recommendations for a More Discriminating Use of Insecticides, by W. M. Hoskins, A. D. Borden, and A. E. Michelbacher (pp. 119–123) (Univ. Calif.); The Tolerance on Fluorine and Cryolite Spray Residue, by S. Marcovitch (pp. 125–128); Tree and Fruit Injury and Spray Residue Removal as Related to the Use of Insecticides in the State of Washington, by F. L. Overley and E. L. Overholser (pp. 135–143) (Wash. Sta.); Spray Residue on Apples and Its Relation to Pest Control, by R. L. Webster (pp. 145–149); The Spray Residue Situation in Illinois, by W. A. Ruth (pp. 151–152); The Use of Methyl Bromide as a Fumigant, by M. A. Stewart (pp. 153–158); Bromide Content of Certain Foodstuffs Fumigated With Methyl Bromide, II, by H. C. Dudley, R. R. Sayers, and P. A. Neal (pp. 159–163); Fumigation Practices With Methyl Bromide, by L. A. Hawkins (pp. 165–166); Insecticides, Pest Control Agents, and Spray Residues in Relation to the Public Health—Fluorine Toxicity, by F. DeEds (pp. 177–183); Some Physiological and Nutritional Aspects of the Spray Residue Problem as It Relates to Lead Arsenate, by H. H. Mitchell and J. B. Shields (pp. 205–213); The Relation Between the Composition of the Arsenates and Their Action as Insecticides and Residual Poisons, by E. R. de Ong (pp. 215–216); Growth and Composition of Crops in Relation to Arsenical Spray Residues in the Soil, by S. C. Vandecaveye (pp. 217–

223); and Health Problems in Pest Control Poisons, by P. J. Hanzlik (pp. 225–227).

New potential insecticides, R. C. Roark. (U. S. D. A.). (*Soap and Sanit. Chem., 19 (1943), No. 1, pp. 95–96*).

Experiments with arsenical and nonarsenical insecticides, D. C. Mote and B. G. Thompson (*6. Pacific Sci. Cong., Calif., 1939, Proc., vol. 6, pp. 129–134*).—In control work with the codling moth on apple and pear at Monroe, Oreg., by the Oregon Experiment Station, extending over a period of more than 11 yr., calcium arsenate, magnesium arsenate, potassium aluminofluoride, nicotine sulfate 40 percent, pyrocide 40 (a pyrethrum extract), sodium aluminofluoride, barium silicofluoride, and rotenone were used. The report includes a brief discussion of the climate and rainfall of the region, presented because of their important bearing upon the harmful effects of certain insecticidal materials on foliage and fruit. Of all the substitutes for arsenate of lead that were tested, calcium arsenate gave the best results. Used at the rate of 3 lb. to 100 gal. of water plus 2 lb. of hydrated lime in the cover sprays, it was only slightly less effective than lead arsenate. Calcium arsenate has been used as a substitute for lead arsenate in the codling moth spray program in the Willamette Valley during the last 6 yr. with excellent results. The addition of lime or other material as a buffer to prevent damage to the foliage and fruit does not appear to be necessary in that valley.

In control work with the western spotted cucumber beetle, a serious pest on beans grown in the western part of the State for canning, pyrethrum extract spray and dust, calcium arsenate, sodium silicofluoride, and barium silicofluoride were the most effective.

The rapid increase in the production of peas that has taken place in the Pacific Northwest in the last few years has led to the pea weevil becoming a most serious pest. Experimental work has shown that a 0.75 percent rotenone dust applied before the weevil has oviposited will kill nearly 100 percent of the weevils. This has led to the construction of large hooded dusters mounted on trucks which have made possible nearly complete control.

Rapid insecticide testing: Use of the settling mist method for testing of vaporized contact insecticides against houseflies, T. C. Allen, R. J. Dicke, and J. W. Brooks. (Wis. Expt. Sta.). (*Soap and Sanit. Chem., 19 (1943), No. 4, pp. 94–96, 121, illus. 5*).—Report is made of the use of the improvement in the modified procedure (E. S. R., 77, p. 370) for testing petroleum base insecticides of the settling mist type and estimating relative toxicity of insecticidal materials to the housefly. The improvement in the procedure has made possible the completion of 10 tests per hour by a single operator. The method involves replicate testing of small numbers of flies exposed in cages in a settling mist chamber. A comparison was made of the settling mist and the Peet-Grady methods, samples of plant extractives in kerosene solution being tested. The results of these tests, the details of which are tabulated, have shown the settling mist procedure to have a wide range of evaluation and a sharp degree of differentiation in toxicity. It is pointed out that this procedure is especially adapted to laboratories with a limited amount of space, and the equipment is relatively inexpensive to construct.

Insecticide testing, Peet-Grady method (*Blue Book [Soap and Sanit. Chem.], 1943, pp. 191, 193–196*).—The details are given of the official method of the National Association of Insecticide and Disinfectant Manufacturers for evaluating liquid household insecticides.

N. A. I. D. M. specifications: Official specifications of the National Association of Insecticide and Disinfectant Manufacturers for insecticides and disinfectants (*Blue Book [Soap and Sanit. Chem.], 1943, pp. 181–182*).

Small chamber method for testing effectiveness of insecticides against houseflies, C. W. Kearns and R. B. March. (Univ. Ill.). (*Soap and Sanit. Chem., 19 (1943), No. 2, pp. 101, 103–104, 128, illus. 6*).

Disinfectant testing: Varying phenol coefficient results on tests of certain disinfectants, C. M. Brewer. (U. S. D. A.). (*Soap and Sanit. Chem., 19 (1943), No. 4, pp. 101, 103, 107*).

Disinfectants and antiseptics: A summary of scientific advances during 1942, E. G. Klarmann (*Soap and Sanit. Chem., 19 (1943), No. 1, pp. 97, 99, 101, 103–104, 107*).

Effect of lead arsenate in soil on vegetables, W. E. Fleming, F. E. Baker, and L. Koblitsky. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 231–233*).—The preliminary experiments here reported indicate that the application of lead arsenate to soil reduced the germination of string beans and lima beans but did not seriously impair the germination of asparagus, broccoli, carrots, cauliflower, corn, cucumbers, eggplant, okra, onions, parsnips, radishes, tomatoes, turnips, and watermelons. The results indicate that lead arsenate in the soil might be expected to retard the seedling growth of many of the vegetables, and with the exception of beets, eggplant, peppers, sweetpotatoes, white potatoes, and tomatoes a reduction in the yield might be expected on soil containing large quantities of lead arsenate. Little arsenic was found in the edible portion of most of the vegetables grown in soil treated with lead arsenate; the largest quantities were found in lettuce, onions, radishes, and turnips.

Sampling studies on orchard spray residues in the Pacific Northwest, C. C. Cassil, F. M. Wadley, and F. P. Dean. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 227–231, illus. 2*).—The sampling of residues from lead arsenate sprays in apple orchards of the Pacific Northwest, consideration being given to variation between plats, between trees within plats, between levels in the trees, between spray applications, and between samples within subclasses, is reported. The findings have led to the conclusion that arsenic deposits measured after spraying are more variable than those measured before spraying, and are somewhat erratic in variation. "Variation between sections of the tree barely reaches significance, but may well be allowed for in sampling. Trees within plats vary nearly as much as do plats; samples within trees are definitely less variable than trees. More gain in sampling precision will come from increasing the number of trees per treatment than the number of apples per tree. In future work in this laboratory it is proposed to take from each tree a single sample of 25 apples representing all sections. For odds of 19:1 it is estimated that 10 to 20 trees taken at random will be needed to recognize 15- or 10-percent differences, and when the same trees are sampled throughout a spray season 4 to 8 trees will suffice to show the same differences."

Fumigation with methyl bromide, G. A. Dean and R. T. Cotton (*U. S. Dept. Agr. Cir. 390, insert (1943), pp. 5*).—This material has been prepared for insertion in Circular 390 (E. S. R., 76, p. 214).

Development of new methyl bromide fumigation schedules for use against Japanese beetles, H. C. Donohoe. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 260–262*).—Experimental fumigations in portable chambers, refrigerator and van-type truck bodies, a gas-proofed duck cover, and refrigerator cars have demonstrated the practicability of five methyl bromide fumigation schedules within the minimum temperature range from 60° to 95° F. These are for use in treatments to free fresh produce from live Japanese beetles in compliance with quarantine regulations. Two of the schedules are modifications of existing ones and three are new.

Further applications of methyl bromide as a fumigant, H. A. U. Monro and R. Delisle (*Sci. Agr., 23 (1943), No. 9, pp. 546–556, illus. 1*).—"At atmospheric pressure and at temperatures above 60° F., doses of 1.5 to 2 lb. of methyl bromide per 1,000 cu. ft. for 16 to 18 hr. were found to be effective against insects liable to be found in imported broomcorn. This treatment could be applied in airtight refrigerator or steel box cars. In the vacuum treatment, complete mortality of all insects liable to be found in the bales can be attained with a dose of 2.5 lb. of methyl bromide per 1,000 cu. ft. in a sustained vacuum of not more than 2 in. of absolute mercurial pressure for a period of 2.5 hr., with vault and bale temperatures of not less than 75° and 60°, respectively. There is considered to be no hazard to persons handling the fumigated bales as long as normal air-washing routine is followed and continuous ventilation is provided for 24 hr. after they are placed in storage. The same fumigant can be used to kill larvae of the pea moth (*Laspeyresia nigricana* Steph.) in green peas when applied at the rate of 2 lb. per 1,000 cu. ft. for 2 hr. at normal summer temperatures Dried peas suffered no loss of germinative power following standard vacuum and atmospheric fumigations with methyl bromide. Nonvolatile bromide residues found in the peas after fumigation would not provide any consumer hazard."

Fumigation of tobacco at reduced pressures, R. W. Brubaker and W. D. Reed. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 300–303, illus. 2*).—The tests reported have shown that at dosages of 4 lb. per 1,000 cu. ft. methyl bromide and hydrocyanic acid were about equally effective against larvae of the cigarette beetle. Methyl bromide was more toxic than hydrocyanic acid in the treatments using 3 and 2 lb. of fumigant, while hydrocyanic acid was more effective at the 1-lb. dosage. The 1,1-dichloro-1-nitroethane proved less toxic than methyl bromide and hydrocyanic acid at these concentrations. This gas is comparatively new in the field of tobacco fumigation, and these tests indicate that it can be used safely on tobacco. They also failed to show that methyl bromide had any deleterious effects on the imported cigarette tobaccos. Fumigants which might combine with the waxes, fats, and oils in the tobacco leaf would be likely to affect the aroma of the tobacco and the smoke. The need for further work with 1,1-dichloro-1-nitroethane and methyl bromide is indicated.

Relation of chemical constitution of some N-heterocyclic compounds to toxicity to Tetranychus telarius (L.), H. L. King and D. E. H. Frear. (Pa. Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 263–265*).—Eight N-heterocyclic compounds related to pyridine were tested as contact acaricides on the common red spider. The results indicated that "(1) the addition of one or two methyl groups did not increase the toxicity of the pyridine nucleus, (2) the addition of an amino group in the α-position markedly increased the toxicity of the molecule to the mite, and (3) the condensation of the pyridine nucleus with benzene ring to form quinoline resulted in increased toxicity, while condensation with two benzene rings to form acridine further increased the toxic action toward the mites. The increasing order of toxicity of all the compounds tested is as follows: Pyridine=α-picoline=β-picoline=2-6-lutidine <2-me-6-amino-pyridine=2-amino-pyridine<quinoline<acridine. The increasing order of toxicity was found to be nearly the same as the increasing order of boiling points."

Relation of composition to the efficiency of foliage or summer type petroleum fractions, P. J. Chapman, G. W. Pearce, and A. W. Avens. (N. Y. State Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 241–247, illus. 2*).—Tests were made of a number of petroleum fractions of the so-called summer-type spray oils to determine their efficiency in killing eggs of the oriental fruit moth, codling moth, and eye-spotted bud moth. Efficiency was found related to the chemical composition of the oils. Thus, the oil most predominantly paraffinic in character was found 10 times more efficient than some of the so-called naphthenic type. Contrary to common belief, highly refined or white oils were more efficient than the corresponding less refined products. In other words, the efficiency was increased with the removal of the aromatic constituents. The three species of insects studied showed no significant difference in their response to the oils tested.

The effect of diluents on the toxicity of pure ground derris root in dusts, N. TURNER. (Conn. [New Haven] Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 266–272, illus. 6*).—In reviewing the literature the author has found that both quantitative and qualitative differences had been observed between different diluents used with pure ground derris root. In the present study dosage-response curves were used to calculate the differences between the diluents. In the laboratory, pyrophyllite, flaky talc, fibrous talc, and clay diluents were effective in the same order as found by Wilson and Janes (E. S. R., 88, pp. 221, 365). Further, pyrophyllite actually increased the expected effectiveness of pure ground derris root when used in amounts of 3 parts or more to 1 part of root. The character of the dosage-response curves obtained in the laboratory was such that no dosage for equal control could be obtained without extrapolation. In all cases, mortality following use of 0.25 percent rotenone with pyrophyllite was higher than from 2 percent rotenone with fibrous talc or clay. The findings in dosage for equal control in the field tests indicate that 1 part of derris suitably diluted with pyrophyllite is as effective as from 2.5 to 5 parts of derris diluted with clay. These relationships hold at relatively high levels of control. If the control obtained by 1 percent rotenone with clay is accepted as the desirable standard, not more than 0.4 percent rotenone with pyrophyllite produced the same degree of control. Not more than 0.3 percent rotenone with pyrophyllite would be required to equal the control following use of 0.75 percent rotenone with clay.

Pyrethrum culture in Dalmatia, with some applications to the Americas, A. HARTZELL (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 320–325, illus. 4*).

Pyrethrum analysis: A modification of the hydrogenation method for determination of pyrethrins, J. B. LAFORGE and B. B. BENDIGO. (U. S. D. A.). (*Soap and Sanit. Chem., 19 (1943), No. 4, pp. 100, 107*)

Effects of oxygen and sunlight on decomposition of rotenone in spray mixtures, F. A. GUNTHER. (Calif. Citrus Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 2. pp. 273–281, illus. 4*).—Analytical evidence is presented to prove both the oxygen-induced decomposition and the photodecomposition of rotenone and derris-containing preparations incorporated into spray materials. The theoretical and the practical aspects of the conclusions derived from the data are discussed. Several suggestions as to possible theoretical avenues of approach to further quantitative theoretical and practical analyses of the problem are made. The advisability of protecting all spray materials incorporating rotenone and/or its congeners against the adverse effects of atmospheric oxidation, sunlight, and high temperatures is emphasized. These toxicants by themselves are drastically short-lived under field conditions.

Detection and estimation of dihydrorotenone in the hydrogenation products of rotenone, L. D. GOODHUE and H. L. HALLER. (U. S. D. A.) (*Indus. and Engin. Chem., Analyt. Ed., 12 (1940), No. 11, pp. 652–654, illus. 1*).

Insecticidal smokes: Their application in the control of household insects, L. D. GOODHUE and W. N. SULLIVAN. (U. S. D. A.). (*Soap and Sanit. Chem., 17 (1941), No. 8, pp. 98–100, illus. 3*).—In further work by the authors and their associates (E. S. R., 83, p. 372; 84, p. 643; 85, p. 220; 86, p. 356), fumigation with insecticides in the form of a smoke or aerosol is discussed, and suggestions for the practical use of chemicals with little or no volatility are presented. Rotenone and pyrethrum and several synthetic compounds were tested on a laboratory scale. Methods of stabilizing and increasing the insecticidal action of these smokes by the addition of oleic and lauric acids are described. Naphthalene was stabilized by adsorption on cornstalk smoke. The most practical synthetic compound appears to be orthodichlorobenzene. This material was found to be effective against houseflies, cockroaches, and bedbugs.

Insecticidal aerosol production: Spraying solutions in liquefied gases, L. D. Goodhue. (U. S. D. A.). (*Indus. and Engin. Chem., 34 (1942) No. 12, pp. 1456–1459, illus. 6*).—Reporting further upon work noted above and previously (E. S. R., 87, p. 254), a description is given of a new method of producing insecticidal aerosols that has been developed. "A solution in some low-boiling solvent, such as dichlorodifluoromethane or methyl chloride, is allowed to escape under its own pressure through a nozzle. An aerosol well adapted for the control of flies and mosquitoes in the presence of man is prepared by spraying a solution of purified pyrethrum extract and sesame oil in dichlorodifluoromethane. It is highly toxic to many species of insects and nontoxic to man, is nonflammable, and does not produce oily deposits. This solution is manufactured commercially and packaged in 1-lb. dispensers, but the entire output is being used by our armed forces. Other insecticides, such as nicotine, which themselves are toxic to man, can also be applied with methyl chloride, especially for greenhouse fumigation. These aerosols are much more finely divided than the mists produced by most spraying methods, and they settle more slowly. A method of studying and comparing the settling rates of mists and aerosols has been developed. A blue dye is included in the solution, and the settling rate can be quantitatively determined with a photometer."

Influence of carbon tetrachloride on the toxic efficiency of certain volatile organic compounds, R. N. Jefferson. (Iowa State Col.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 253–259, illus. 6*).—The dosage-mortality curves of methyl bromide, methyl formate, ethylene dichloride, and carbon tetrachloride for the red flour beetle at 30° C. and 2 hours' exposure are presented. Methyl bromide and methyl formate are much more toxic to the red flour beetle than ethylene dichloride and carbon tetrachloride, the latter two being nearly equal in toxicity at the 50-percent point. The two curves cross at the point representing 16-percent mortality, and there is not a significant difference in toxicity with concentrations that kill less than 42 percent. Carbon tetrachloride was also mixed with methyl bromide, methyl formate, and ethylene dichloride in equitoxic units in several proportions, and the dosage-mortality curves for these mixtures are presented.

Sesame in insecticides, C. Eagleson. (U. S. D. A.). (*Soap and Sanit. Chem., 18 (1942), No. 12, pp. 125, 127, illus. 2*).

The Araneida found on cotton in central Texas, M. Kagan. (Tex. A. and M. Col.). (*Ann. Ent. Soc. Amer., 36 (1943), No. 2, pp. 257–258*).

The effect of the hot water treatment for cyclamen mite upon cyclamen plants, J. P. Johnston. (Conn. [New Haven] Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No 2, pp. 286–289*).—"Treatment with hot water at 110° F. for 15 min. of more than 100 cyclamen plants in 5- and 6-in. pots, in various stages of bud and bloom, severely injured the plants. The majority of the plants lost numerous buds and blooms 2 or more weeks after the treatment, which lessened their commercial value, while a few plants were a total loss. Other groups, totaling more than 125 plants, heavily infested with the cyclamen mite, were treated in a similar manner to observe the effect of the treatment upon the mites. Mortality of 100 percent was obtained with one exception, when a single live mite was found under a bud scale. These treatments indicated that the reaction of the plants varied greatly and that injury occurred and increased as the plants approached maturity." It is concluded from the results obtained that the initial period at which injury due to the hot water treatment occurs comes at that stage of plant growth when the flower buds begin to appear. Further, if treatments are made after the flower buds appear, the injury will increase progressively with older plants. In general, under commercial conditions, growing cyclamen plants should be treated not later than late August or early September when the early flower buds may be expected. Complete kill of the cyclamen mite at this time, together with care to prevent reinfestation, will probably permit the successful production of cyclamen plants.

Protecting man and livestock from ticks, L. HASEMAN and R. W. PORTMAN (*Missouri Sta. Cir. 271 (1943), pp. [4], illus. 1*).—A practical account.

The Hydropsychidae of Minnesota (Trichoptera), D. G DENNING. (Minn. Expt. Sta.). (*Ent. Amer., 23 (1943), No. 2, pp. 101–171, illus. 41*).

Lygus bugs attack many crops, G. F. KNOWLTON and C. J. SORENSON (*Farm and Home Sci [Utah Sta.], 4 (1943), No. 2, p. 12, illus. 1*).—A practical account.

The influence of leguminous plants on the abundance of tarnished plant bugs, E P. VENABLES and D. B. WADDELL (*Canad. Ent., 75 (1943), No. 4, p. 78*).—Experiments have shown that the tarnished plant bug population on red clover and alfalfa is much greater than on white Dutch clover, and that the use of white Dutch clover as a cover crop in orchards subject to tarnished plant bug attack would be worth while. Spray applications and cultural practices cannot be relied upon to prevent injury by this plant bug to buds of apple and pear, and the same is true regarding damage to peach fruits, commonly referred to as "catfacing." The damage is caused by mature insects which survive the winter and emerge from their hibernating quarters to feed upon buds and fruits early in the year. The bugs are especially abundant in orchards with permanent cover crops of either red clover, sweet clover, or alfalfa.

Two pests of legumes: Alydus eurinus Say and A. pilosulus Herrick-Schaeffer, G. W. UNDERHILL. (Va. Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 289–294, illus. 5*).—Report is made of a study of the two broad-headed bugs *A. eurinus* and *A. pilosulus*, both of which are widespread in Virginia, feeding on nectar glands, stems, and seed pods of practically all legumes, both cultivated and wild. Of cultivated crops, the lima bean, soybean, and cowpea are most seriously injured. The germination of the injured seeds is reduced, and the vigor of the plants developing from these seeds is lowered. There are two full generations and probably a partial third generation of each of these insects in eastern Virginia. Both insects pass the winter in the egg stage. Life history data for both species are included.

The Comstock mealybug on apples and peaches in New Jersey, B. F. DRIGGERS and E. J. HANSENS. (N. J. Expt. Stas.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 222–226*).—Discovery of the presence of the Comstock mealybug in damaging numbers in two apple orchards in central New Jersey in the fall of 1941 was followed by the finding of a heavy infestation in a peach orchard in Burlington County in 1942. In each of the three orchards severe mealybug damage was associated with old and vigorously growing trees, a relationship previously noted in Virginia. The liberation in 1942 of two introduced species of parasites (*Pseudaphycus* sp. and *Allotropa* sp.) on the first brood of mealybugs in the two apple orchards in central New Jersey resulted in the establishment of both species and a build-up to a point where roughly one-third of the second-brood mealybugs were parasitized. A marked reduction in damaged fruit resulting from mealybug activity was observed in these two orchards in 1942 as compared to 1941. The reduction in mealybug injury is believed to be due to a combination of parasite activity, unfavorable weather for mealybug build-up in the late summer and fall of 1942, and a change in tree growth brought about by a change in soil management practices.

Mass production of the California red scale and its parasite Comperiella bifasciata, S. E. Flanders. (Calif. Citrus Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 233–235*).—Squashes have been found to be suitable mediums for the mass production of diaspine scale insects, over 2 million specimens of the parasite *C. bifasciata* How. having been produced from the California red scale grown on banana squash during the year ended July 31, 1942, at the California Citrus Station. A description is given of the technic of producing the California red scale and parasite.

Effectiveness against the California red scale of cube resins and nicotine in petroleum spray oil, A. W. Cressman. (U. S. D. A.). (*Jour. Agr. Res. [U. S.], 67 (1943), No. 1, pp. 17–26, illus. 1*).—Both nicotine and cube in oil sprays increased California red scale mortality on all parts of the tree as compared with oil alone. Sprays with cube resins were more effective against scales on wood than those containing nicotine, and those containing 2 percent oil were more effective on all parts of the tree. The addition of cube resins for heavy infestations on older wood increased mortality from 12.8, 58.1, and 58.6 percent to 43.9, 91.2, and 94.5 percent for the applications of 1, 1.5, and 2.0 percent of oil, respectively. Except in cases of high mortality, spray mortality varied inversely with the density of infestation. Mortality was least on heavily infested gray wood.

The leafhoppers of Minnesota (Homoptera: Cicadellidae), J. T. Medler (*Minnesota Sta. Tech. Bul. 155 (1942), pp. 196, illus. 9*).—Keys are included to the 15 subfamilies and to the various genera and species. Each species is briefly described and its distribution in Minnesota noted. The publication also contains numerous literature citations, plates, and indexes of both plant and leafhopper names.

Pea aphid control in eastern Virginia in 1942, H. G. Walker and L. D. Anderson. (Va. Truck Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 281–285*).—In continuation of the earlier work (E. S. R., 84, p. 80) a 4 percent nicotine dust made from Black Leaf 40 was nearly as effective as one made from Black Leaf 10, while a 4 percent nicotine dust made from Black Leaf 155 was better than either of these in one test and not as good in two others. This is said to be in accord with the authors' unpublished data on the control of the cabbage aphid and the green peach aphid, in which dusts made with Black Leaf 155 gave good results in some tests and rather poor results in others. "A 3 percent nicotine dust made from Black Leaf 10 gave nearly as good results as did one containing 4 percent nicotine. Black Leaf 10 dusts containing 2 or 3 percent nicotine in combination with 0.25 or 0.50 percent rotenone gave about the same initial kill but had more residual effect than the 4 percent nicotine dusts. Except for the nicotine-rotenone-sulfur dust used in the fourth test the nicotine-rotenone dust combinations did not give quite as good control as did cube-pyrophyllite dusts containing 0.75 and 1.0 percent rotenone. However, none of the differences between these dust combinations were statistically significant. Cube-pyrophyllite dusts containing 0.75 or 1.0 percent rotenone were significantly better than those containing 0.2 or 0.4 percent rotenone. The addition of 2 percent peanut oil and 1 percent Vatsol OS did not improve the effectiveness of a cube dust containing 0.75 percent rotenone. A cube dust containing 0.75 percent rotenone was only slightly more effective when applied at the rate of 60 lb. per acre than when applied at the rate of 41 lb. per acre. Cube dusts containing 0.2 or 0.4 percent rotenone plus 3 percent by weight of an aliphatic thiocyanate (Lethane 60) were as effective in controlling the pea aphid as any of the other dusts tested, with an indication in one test that the dust containing 0.2 percent rotenone might not be quite as effective as the dust containing 0.4 percent rotenone. The cube dusts containing Lethane 60 gave significantly better results than did similar dusts without the Lethane 60."

Thiocyanate compounds for pea aphid control, H. F. Wilson and E. J. Campau (*Soap and Sanit. Chem., 19 (1943), No. 2, pp. 105, 107, 109*).—Since all thiocyanate compounds are known to be quite toxic to insects and to plants when applied in high concentrations, care must be used in the dosage. In greenhouse tests Lethane 60, Loro, and Thanite have proved to be quite toxic to the pea aphid. The preliminary series of tests here presented strongly indicate that dust mixtures containing 0.1 to 0.25 percent rotenone and 2 percent Lethane or 1 to 2 percent Loro are comparable with dust mixtures containing 0.75 percent rotenone and 1 percent SAE10 lubricating oil. The details are tabulated.

Attractiveness of certain plant constituents to the Japanese beetle, G. S. Langford, M. H. Muma, and E. N. Cory. (Univ. Md.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 248–252*).—Tests made with 52 chemicals, principally of plant origin or derivation, showed that at least 30 were to some degree attractive to the Japanese beetle. Attractants were found among the essential oils, alcohols, acids, aldehydes, and esters. Combinations of these attractants were, on the whole, more attractive than the constituents when used separately. In 19 different combinations, 15 exceeded the value of any one constituent when used alone, but in four instances the attractive values were less than that for a single constituent. In five cases the combinations were more attractive than the combined value of all the attractants in the mixture. It was observed that where comparatively pure chemicals such as eugenol, caproic acid, and valeric acid were combined in equal volume with another substance the value of the mixture approached or slightly exceeded the sum of the value of the two substances. In some instances mixtures of unequal volume exceeded in value the sum of the values of the constituents. Wide variations occurred when some of the essential oils were mixed, and it is pointed out that this could be expected due to their complex chemical nature and the possibility of ingredients that might repel beetles or mask attractive ingredients. Observations indicated that certain attractants could be diluted with apparently nonattractive substances without materially injuring attractive values. The results obtained in these studies indicate possibilities for improved baits as well as substitute attractants for the present standard bait.

Investigations on the treatment of solid timber with boric acid to render it immune from the attack of the powder post borer Lyctus brunneus Stephens.—I, Laboratory and preliminary investigations, J. N. Gregory (*Jour. Council Sci. and Indus. Res. [Austral.], 15 (1942), No 3, pp. 233–244, illus. 6*).—It was concluded that treatment with boric acid will render *Lyctus*-susceptible timber permanently immune from such attack in sheltered positions. Boric acid, being soluble in water, is not recommended for treating timber for use in exposed situations where rain will leach it out. No claim is made for it as a general preservative, as it has so far only been tested against *L. brunneus*, but there is a possibility, since it is so toxic to *Lyctus*, that it will prevent other insect attack. However, surface stains and molds have been observed growing on moist boric acid-treated timber.

Experiments with the peach tree borer in North Carolina, C. F. Smith. (N. C. Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 2, pp. 215–218*).—In the experimental work reported ethylene dichloride emulsion gave a more satisfactory control of the peachtree borer than did paradichlorobenzene. Ethylene dichloride emulsion was used with equal effectiveness each year, 1939–41, between September 25 and February 16. However, the author considers it advisable to treat between October 1 and 15 in North Carolina when using either ethylene dichloride or paradichlorobenzene. It appears definitely advantageous to mound peach trees when using ethylene dichloride emulsion, but it is not necessary to pat down the mound in sandy soil. A small mound is as efficient as a large mound.

Common insect pests of New York.—12, The European corn borer, L. A. Carruth (*New York State Sta. Cir. 176, rev. (1943), pp. [4], illus. 1*).—A revision (E. S. R., 78, p. 362).

The significance of growth stages of sweet corn as related to infestation by the European corn borer, R. L. Beard (*Connecticut [New Haven] Sta. Bul. 471 (1943), pp. 169–199, illus. 5*).—Fourteen plantings of Marcross and Lexington hybrids were observed for borer oviposition and control.

In general, availability of growth stages of corn at time of maximum oviposition determines which stages receive the most eggs. The fact that oviposition is delayed on some plantings until the plants reach a favorable size is responsible for shifts in the oviposition trends as related to time. Although the total number of eggs deposited by second-generation borers exceeds the number deposited by the first generation on the per plant basis, the first planting of the season receives the largest number of eggs. Since second-generation moths are present for a longer period of time than first-generation moths, more corn is available to attack by the second generation. Most of the first-generation eggs are deposited on early tassel stage or younger corn, while most of the second-generation eggs are deposited on corn in the early tassel and later stages. Oviposition on Lexington and Marcross sweet corn did not differ significantly, although survival of the first-generation borer was consistently lower in Lexington. "It is suggested that the resistance of corn at different growth stages and the resistance of one strain of corn as compared with another are but two expressions of the same fundamental phenomenon, and that a 'resistant' strain may owe its resistance to a differential growth rate at a particular time relative to the pattern of infestation. If the pattern is different, the resistance may be lost."

Recommendations for a sugarcane borer control program in Louisiana, A. L. Dugas (*Louisiana Sta. Bul. 363 (1943), pp. 14, illus. 5*).—A practical control program for Louisiana is outlined.

The moths of South Africa, II–IV, A. J. T. Janse (*Gezina, Pretoria: Author, 1933–35, vol. 2, pp. 448+, illus. 144; 1937–39, vol. 3, pp. 435+, illus. 103; 1940, plates to vol. 3, illus. 46; 1942, vol. 4, pt. 1, pp. 78+, illus. 16*).—Volume 2 of this work (E. S. R., 69, p. 557) concludes the family Geometridae; volume 3 deals mainly with a portion of the Noctuidae, apart from the small families of Cymatophoridae and Callidulidae; and volume 4, following a list of publications by the late Edward Meyrick (pp. XI–XXV), with the Hepialidae, Prototheoridae, and Micropterygidae. Plates in continuation of those published separately to volume 3, to form ultimately a volume by itself, are attached. New genera erected are included, and many species new to science are described in these volumes.

Lead arsenate and tricalcium arsenate combinations for the control of codling moth, R. L. Parker and P. G. Lamerson. (Kans. Expt. Sta.). (*Jour.*

Econ. Ent., *36* (*1943*), *No. 2, pp. 205–210*).—In work with lead arsenate and tricalcium arsenate combinations for codling moth control, the tricalcium arsenate-bentonite plat was the least effective of all the spray combinations tested. "Only 34 1 percent of clean fruit resulted from the use of this material. Arsenical burn was more severe on the foliage of this plat than it was with any of the other spray combinations tested. The lead arsenate-bentonite mixture was slightly more effective in codling moth control than was lead arsenate alone. The foliage injury, however, was less than for the tricalcium arsenate-bentonite treatment. The spread in effective control obtained on the four lead arsenate-zinc sulfate-summer oil emulsion plats ranged from 80.8 to 86.3 percent clean fruit. The foliage on all these plats had less arsenical burn than on the plats sprayed with tricalcium arsenate-bentonite, lead arsenate-bentonite, or lead arsenate alone. Less defoliation took place on the lead arsenate-zinc sulfate-summer oil emulsion plats than on the other plats. The percentage spread in effective control of codling moth of the best lead arsenate-zinc sulfate-oil plat over lead arsenate alone was 7 3 percent. The percentage spread of wormy fruit on all plats containing some combination of lead arsenate ranged from 3.5 to 6 2 percent. The percentage spread of stung fruits ranged from 11.1 to 16.9 percent. Fewer stung fruits resulted on the plats receiving the greater number of lead arsenate-zinc sulfate-summer oil emulsion sprays. The stings on all plats containing some combination of lead arsenate were light, and most of them were well healed over, difficult to observe, and left fruit usable at harvest.

"A disadvantage was apparent for all of the zinc sulfate plats in that the fruit which matured later, due to foliage excellence, had less color and appeared less desirable when compared to the better colored fruit on the tricalcium arsenate-bentonite, lead arsenate-bentonite, and lead arsenate alone plats. . . . All samples of harvested apples, when analyzed for arsenical residue, had more than the tolerance of 0.025 gr. of arsenic per pound of fruit. The acid wash reduced all of them to the tolerance or below it. The lead arsenate-zinc sulfate-summer oil combination with five oil sprays, when washed, still bore a residue of 0.025 gr. of arsenic per pound of fruit."

The effect of tartar emetic on the greenhouse leaf-tyer (Phlyctaenia rubigalis Gn.), G. G. Dustan (*Sci. Agr.*, *23* (*1943*), *No. 9, pp. 527–536*).—The experiments have shown that tartar emetic sprays cause high mortality of greenhouse leaf tier larvae, the early instars being more susceptible than the later. The addition of brown sugar increased the effectiveness of the spray, while the addition of spreaders lowered it. Dusts containing from 5 to 10 percent of tartar emetic were also effective against the larvae. Data are presented to show that larvae are killed by both stomach poisoning and by contact. Tartar emetic residues on the foliage resulted in shortening the life of the moths, reducing the number of eggs laid, and increasing the mortality of the resulting larvae.

Feeding habits of the southern armyworm and rate of passage of food through its gut, H. H. Crowell. (*Ohio State Univ*). (*Ann. Ent. Soc. Amer.*, *36* (*1943*), *No. 2, pp. 243–249*).—Observations made of the general feeding habits and type of food plants eaten by the southern armyworm are reported.

The spruce foliage worm and the spruce cone worm (Dioryctria spp., Lepidoptera: Pyralidae), M. R. MacKay (*Canad. Ent.*, *75* (*1943*), *No. 5, pp. 91–98, illus. 3*).—This contribution relates to two species of pyralid moths of the genus *Dioryctria*, the adults of which resemble each other so closely that one is easily mistaken for the other, although the seasonal history and habits differ very materially. *D. abietella* D. and S. normally feeds in the young cones and occasionally on the foliage of nearby twigs. It spins its cocoon in the fall, and the adults emerge in early June of the following year. *D. reniculella* Grt. feeds primarily on the foliage of the terminal shoots. The larvae mature in June, and the adults emerge in July.

Protect roasting ears from worms, H. E. Brown, C. G. Vinson, and L. Haseman (*Missouri Sta. Cir. 270 (1943), pp. 8, illus. 3*).—Suggestions for combating the corn earworm.

Crambus hortuellus Hb. as a grassland pest, H. W. Thompson (*Ann. Appl. Biol., 29 (1942), No. 4, pp. 393–398, illus. 2*).—Account is given of injury to grasslands caused by *C. hortuellus.* Although it has been a source of injury to grasslands in Canada and the United States, where it is commonly known by the name of sod webworm, this is the first record of its being of economic importance in Great Britain.

Five new western Dolichopodidae (Diptera), F. C. Harmston and G. F. Knowlton. (Utah Expt. Sta.). (*Bul. Brooklyn Ent. Soc., 38 (1943), No. 3, pp. 101–107*).

New Tachinidae from northeastern United States (Diptera), H. J. Reinhard. (Tex. Expt. Sta.). (*Bul. Brooklyn Ent. Soc., 38 (1943), No. 3, pp. 78–90*).—Six genera are erected and descriptions given of seven new species of tachinid flies, mainly from New York and Ohio.

A review of the Canadian species of Ernestia sens. lat. (Tachinidae: Diptera), A. R. Brooks (*Canad. Ent., 75 (1943), No. 4, pp. 66–78, illus. 2*).—Two genera are erected and three species described as new.

A recent immigrant tachinid fly parasite of noctuid caterpillars in Hawaii, R. H. Van Zwaluwenburg (*Hawaii. Planters' Rec. [Hawaii. Sugar Planters' Sta.], 47 (1943), No. 2, pp. 81–87, illus. 4*).—*Eucelatoria armigera* (Coq.) is reported as a probable recent accidental introduction on Oahu, possibly from Mexico within wormy tomatoes. An attempt to introduce the insect from Mexico in 1923 was unsuccessful. This fly parasitizes a number of destructive caterpillars, such as the corn earworm, *Plusia chalcites* (Esp.), and armyworms. Even during cooler periods the life cycle may be completed in 3 weeks. The adult females, which live 2 weeks or more, produce about 40 maggots that are inserted within caterpillars by means of a thornlike larvipositor.

A study of the 1942 fly population of New Haven, M. E. Power, J. L. Melnick, and M. B. Bishop (*Yale Jour. Biol. and Med., 15 (1943) No. 5, pp. 693–705, illus. 7*).

The persistence of poliomyelitis virus in flies, F. B. Bang and R. W. Glaser (*Amer. Jour. Hyg., 37 (1943), No. 3, pp. 320–324*).—The experiments reported, in which Theiler's mouse poliomyelitis and Armstrong's mouse-adapted human poliomyelitis virus was used, show that the virus may be recovered from the adult fly only when the adult itself is infected by feeding. Theiler's virus may be recovered from the housefly as long as 12 days after infection, but the mouse-adapted human strain survived only 2 days in the housefly. The authors were unable to recover the mouse-adapted Lansing virus from the four other species tested (*Lucilia lepida* (*ceasar*), *Muscina stabulans, Calliphora erythrocephala,* and *Sarcophaga hemorrhoidalis*), while results with the mouse poliomyelitis in these species did not differ essentially from those obtained with the housefly.

Investigations on the biology and control of the carrot [rust] fly (Psila rosae F.), F. R. Petherbridge, D. W. Wright, and P. G. Davies (*Ann. Appl. Biol., 29 (1942), No. 4, pp. 380–392, illus. 3*).—Report is made of a detailed investigation of the biology and of measures for control of the carrot rust fly, commenced in April 1941. Control experiments with the first generation on early carrots by the use of derris dust were not successful. Large numbers of second-generation flies were killed by spraying the dike sides and headlands with a poison bait; this reduced the crop damage in the treated fields. Some control in small-scale experiments was obtained by placing grass cuttings with and without 4 percent calomel dust along the rows.

Differentiation of the two genetic factors for resistance to the hessian fly in Dawson wheat, W. B. Noble and C. A. Suneson. (U. S. D. A.). (*Jour. Agr. Res.* [*U. S.*], *67* (*1943*), *No. 1, pp. 27–33*) —Dawson wheat, resistant to the hessian fly in California, was crossed with susceptible Poso and Big Club, and the hybrid material advanced toward the Poso and Big Club commercial types by the backcross method. Studies of certain of these backcrosses and crosses confirmed the presence of two genetic factors for fly resistance in Dawson as previously reported by Cartwright and Wiebe (E. S. R., 75, p. 670) and demonstrated the successful isolation, differentiation, and recombination of these two factors. A number of lines possessing the Dawson factors were selected from the F_3 generation of the third backcross of Dawson × Big Club to Big Club and composited as an experimental variety, Big Club 38. The performance of this variety over a 4-yr. period indicates the successful application of the breeding method for control of the hessian fly.

The status of the mosquitoes of the Great Swamp in Rhode Island during 1942, H. Knutson. (R. I. State Col.). (*Jour. Econ. Ent.*, *36* (*1943*), *No. 2, pp. 311–319, illus. 2*).—Report is made of a study of the Great Swamp, a typical Rhode Island fresh water swamp, which consists of 14 general larval habitats and in which 18 species of Culicinae have been found to breed. Six additional species came in from nearby, and 4 others were collected in the area. Larval and adult weekly collections from February to December are graphically figured, and the species are discussed in relation to their habitats and relative prevalence.

An experiment on the range of dispersion of Anopheles quadrimaculatus, D. E. Eyles and L. K. Bishop (*Amer. Jour. Hyg.*, *37* (*1943*), *No. 3, pp. 239–245, illus. 1*).—Description is given of a method for the large-scale capture, marking, and recapture of anopheline mosquitoes, together with experiments in which this method was employed. Of the 16,500 marked and released, "the greatest number recaptured at one time was at a point 2 miles away 7 days after release. Of about 15,000 mosquitoes examined, 31 *A. quadrimaculatus* females were recovered at a distance of 2.0 to 2.5 miles or 10,560 to 13,200 ft. from the release point. One male was recovered at a distance of 2.0 miles from the point of release. The conclusion that can be drawn is that in the type of country studied, even taking into account the marked mosquitoes which escaped at the point of marking, *A. quadrimaculatus* females can fly at least 2 miles and most probably 2.5 miles in a relatively short period. It is the opinion of the authors that the conditions of this experiment approximate the conditions which would hold if all people and livestock were removed to a point 2 miles from a prolific source of mosquitoes. The mosquitoes were recaptured from the same barns in which they had originally been caught, but the authors do not believe that this is real evidence for homing as there were no other shelters available." It is pointed out that during the course of the experiment there was no strong wind at any time, nor were there other noteworthy meteorologic phenomena.

Notes on the life history and morphology of Cephenomyia jellisoni Townsend and Lipoptena depressa Say, two dipterous parasites of the Columbian black-tailed deer (Odocoileus hemionus columbianus (Richardson)), I. M. Cowan (*Canad. Jour. Res.*, *21* (*1943*), *No. 6, Sect. D, pp. 171–187, illus. 9*).—Collections of material from deer taken on southern Vancouver Island, B. C., representing all larval stages of the nostril fly *C. jellisoni* are reported. Description is given of the external morphology of the three larval stages and the puparium. The tracheal system of the first instar and the cephalopharyngeal apparatus of all three are described and illustrated. In November and December first instar larvae were found in the nasopharynx of the host, where they remained until after the molt. Until they reach maturity, second and third instar larvae occupy the retropharyngeal recesses of the deer. They leave the host by way of the nostrils and pupate in the ground. Observations on the life history and behavior of *L. depressa*, both on and off the host, follow. It is postulated that the life span on the host varies from 8 to 13 mo., and that during this period from four to seven larvae are produced. Larvae do not pupate on the host but fall to the ground as soon as they are liberated. Infestations on a single host may consist of more than 2,000 flies; under such circumstances the deer evinces discomfort. As yet this fly is not known to be involved in the life cycle of any internal parasite of the deer.

Species of fleas on rats collected in States west of the 102d meridian and their relation to the dissemination of plague, F. M. Prince (*Pub. Health Rpts.* [*U. S.*], *58* (*1943*), *No. 18, pp. 700–708*).—Investigations of the extent and distribution of plague infection among rodents in the Western States, under way for several years, are reported. The data relate to species found on 4,188 rats collected by trapping and shooting during a 6-yr. period (1935–41) in rural areas and cities located west of the 102d meridian in 13 States. Details are tabulated by States. Twenty-one species of fleas were taken.

A taxonomic and distributional study of Simuliidae of western United States, G. S. Stains and G. F. Knowlton. (Utah Expt. Sta.). (*Ann. Ent. Soc. Amer.*, *36* (*1943*), *No. 2, pp. 259–280, illus. 133*).—Included in this contribution are descriptions of four species new to science, namely, *Eusimulium quadratus*, *E. osborni*, *Simulium stonei*, and *S. beameri*.

Bee-killing asilids in New England, S. W. Bromley (*Psyche*, *49* (*1942*), *No. 3–4, pp. 81–83*).—Of 11 species of asilids found from 1911 to 1941 attacking honeybees at Southbridge, Mass., Wallingford and Stamford, Conn., and nearby areas, *Promachus fitchii* O. S. was most commonly met with, followed by *Diogmites umbrinus* Loew, *Proctacanthus philadelphicus* Macq., *P. rufus* Williston, and *Promachus bastardii* Macq.

Some native sawflies of the genus Neodiprion attacking pines in eastern Canada, C. E. Atwood and O. Peck (*Canad. Jour. Res.*, *21* (*1943*), *Sect. D, pp. 109–144, illus. 54*).—Report is made of a study of sawflies of the genus *Neodiprion*, which have become more and more important in recent years due to the variety of species found on native conifers and the increasing frequency of outbreaks caused by them. Due to the difficulty of distinguishing between the species by means of adult characters only, the authors were led to investigate the different stages of the life history. This has resulted in finding it possible to delimit most of the species with a fair degree of certainty. Keys are given for the determination of adult females of 11 and of larvae of 10 species attacking pines in eastern Canada. Two of the species are described as new. The larvae of 2 species appearing in the first key and the adults of 1 species from the second are as yet unknown.

The pine sawfly Neodiprion sertifer Goeff. and its control with concentrated lead arsenate sprays, C. C. Hamilton. (N. J. Expt. Stas.). (*Jour. Econ. Ent.*, *36* (*1943*), *No. 2, pp. 236–240, illus. 4*).—*N. sertifer*, a serious European pest of forest plantings of red and Scotch pines, was found in New Jersey in 1937 doing considerable injury to the plantings of the central part of the State. Sprayings made during two summers have shown that the sawfly larvae may be readily and economically controlled by concentrated sprays of lead arsenate applied by high pressure with a ground sprayer. The spray is not applied directly to the trees but is directed up through or over them and drifts down from above. The best time to apply the spray is when the larvae are

0.25 to 0.4 in. in length or during the latter part of April or in early May. Approximately 100 gal. of the concentrated spray were required per acre for trees averaging 10 to 15 ft. tall and planted 6 by 8 ft.

A destructive apple sawfly new to North America, L. Pyenson (*Jour. Econ. Ent., 36 (1943), No. 2, pp 218–221, illus. 3*).—A report is made of the life history and habits of *Hoplocampa testudinea* Klug., a serious pest in central Europe first announced in June 1942 as occurring in this country, it having been found on Long Island, N. Y., in 1939 and identified from Vancouver Island, B. C., in 1940. The adults emerge from the soil during the blossoming period of apples and lay their eggs in the calyx of the fruit. The larvae first burrow under the skin of the apple and when older hollow out the young fruit, excreting a brick-colored frass. Several apples may be destroyed by one larva. When full grown, usually during the early part of June, the larvae drop with the apples and enter the soil to construct pupal cases. They remain as prepupae in these cases until the next spring, when they transform to pupae and finally to adults. This pest was probably introduced, and may spread to other areas in soil around the roots of plants. The standard calyx, curculio, and first cover sprays on apples do not appear to hold the pest in check.

Population studies of the European spruce sawfly (Gilpinia hercyniae Htg.) in Quebec, R. Martineau (*Forestry Chron., 19 (1943), No. 2, pp. 87–107, illus 8*).—In an endeavor to correlate the abundance of the European spruce sawfly with the ecological factors of the spruce habitat, population studies were performed in the various types of stands found in the Gaspe Peninsula and Matapedia Valley of the Province of Quebec. The emergence of the adult from the cocoon was affected by the thickness of the humus layer. "Apparently a layer of humus of 4 to 6 in. deep would be ideal for maximum emergence. It is also generally true that the deeper the humus the more important is the control by the rodent predators upon the cocoons. Sunlight favors the emergence of the adult from the cocoon. It also influences the larvae in that they prefer feeding in sunny places like the east, south, and west sides of a tree rather than the north. Humidity of the humus was shown to increase adult emergence and reduce mortality. Mice, shrews, and squirrels constitute very important natural agencies in the control of the spruce sawfly. In our studies 60.4 percent of the 645,580 cocoons found within the limits of the plats were chewed by these predators. To date the parasites have been a much less important control factor than the rodents. As a result of the defoliation by the spruce sawfly, a marked decline in the rate of growth of the spruce has been noticed during the last decade."

The first record of Leptothorax, subgenus Goniothorax Emery, in the United States, with the description of a new species (Hymenoptera: Formicidae), M. R. Smith. (U. S. D. A.). (*Ent. Soc. Wash. Proc., 45 (1943), No. 6, pp. 154–156*).

The occurrence of the tick parasite Ixodiphagus caucurtei Du Buysson (Hymenoptera: Chalcidoidea: fam. Encyrtidae) in Great Britain, E. T. Burtt (*Roy. Ent. Soc. London Proc., 18 (1943), No. 4–6, pp. 28–29*).

A living from bees, F. C. Pellett (*New York: Orange Judd Pub. Co., 1943, pp. 304, illus. 67*).

ANIMAL PRODUCTION

Growth and development, with special reference to domestic animals, LVII, LVIII (*Missouri Sta. Res. Buls. 367 (1943), pp. 20, illus. 7; 368, pp. 14, illus. 4*).—A continuation of the series noted on page 584.

LVII. *An index of muscular-work capacity*, H. H. Kibler and S. Brody.—The best index of muscular-work capacity in warm-blooded species was taken as the amount of oxygen consumed per beat of the heart per kilogram of body weight. It was not affected by body size in animals showing such ranges as from the mouse to the elephant. Variations in the index for the basal or resting condition usually represent differences in cardiorespiratory capacity. Sure measurements at rest were usually reliable indexes of work capacity. Bodily energy expenditures calculated from the ratio of oxygen consumption during work and that during rest were characteristic for each horse and man. Measurements of such characteristics are suggested as useful tools for the geneticist to ascertain exceptional abilities of individual animals and trends in the population. The oxygen consumption per minute divided by the pulse rate per minute tended to be directly proportional to the mature weight, but might vary with training and muscular work performed. The index values found for nine horses of variable weights and at different times were compared with similar data for other species, including athletes and sedentary men.

LVIII. *Resting energy metabolism and pulmonary ventilation in growing horses*, S. Brody, H. H. Kibler, and E. A. Trowbridge.—Data are presented with critical discussion on the resting energy metabolism, based on the oxygen consumption and equivalent calories and total digestible nutrients during rest, standing and lying, and pulmonary ventilation in relation to body weight in three Percheron mares and three Percheron geldings from birth to about 5 yr. of age and in two Shetland pony mares to 2 and 3 yr. of age. The influence of age and growth on the resting metabolism of growing animals was appraised, as was done for mature animals (E. S. R., 72, p. 823). The results are critically compared with similar data on cattle (E. S. R., 87, p. 265; 88, p. 320). The pulmonary ventilation rate in horses increases with approximately the ⅔ power of weight in horses as contrasted with the ¾ power of weight in cattle. The results are considered of special interest to students of energy metabolism, physiology, nutrition, and growth, as well as ventilation engineers.

Beef cattle management, W. C. Skelley (*New Jersey Stas. Cir. 454 (1943), pp. 27, illus. 13*).—The principles of breeding and feeding beef cattle are set forth, with special reference to eastern conditions.

A comparison of shelled corn and hominy feed for fattening steers, G. A. Branaman, H. A. Fick, and C. M. Harrison (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 288–290*).—In a comparison of corn and hominy fed for 98 days, 40 steers in dry lot made similar gains on rations with average daily consumption of 11.3 lb. of shelled corn as contrasted with 10.2 lb. of hominy feed per head. When continued for about 100 days on these rations with pasture, those on corn made average daily gains of 2.2 lb. as contrasted with 1.49 lb. by steers on hominy feed rations. The corn-fed cattle were fatter and probably would have sold higher.

Botanical analyses of stomach contents as a method of determining forage consumption of range sheep, J. J. Norris. (Utah Expt. Sta.). (*Ecology, 24 (1943), No. 2, pp. 244–251*).—Wide variability between the amounts of forage fed to sheep and the amounts found in the stomach on slaughter throws considerable doubt on the value of stomach analyses as a quantitative measure of the diet of grazing animals. Remnants of material from previous feedings caused confusion. Stomach analysis showed promise of indication of the plant species consumed, if not the amounts. The study was based on the analyses of stomach contents of 19 slaughtered sheep consuming known amounts of six rations.

Fertility in sheep as affected by nutrition during the breeding season and pregnancy, R. F. Miller, G. H. Hart, and H. H. Cole *(California Sta. Bul. 672 (1942), pp. 31)*.—Continuing studies of the relation of diet to reproduction of ewes (E. S. R., 77, p. 833), experiments were conducted over a 7-yr. period with 238 different ewes in various lots consisting of from 12 to 30 head each. Comparisons were made of the effect on lambing and weights of rations containing adequate or deficient amounts of vitamin A, protein, and phosphorus. Evidently gain in weight during the breeding season was not essential for high fecundity in ewes in good condition. The general conclusion from these tests indicated that a deficiency of vitamin A affects normal reproduction. Although depletions of vitamin A in the liver and of phosphorus in the blood were slow processes, they may occur in dry years and become a serious factor in lamb mortality. If a high-percentage lamb crop is to be maintained, low-protein and low-phosphorus rations must be avoided. Confirming previous findings of McElroy and Goss (E. S. R., 85, p. 384), sheep did not seem to need additional quantities of the B complex.

Successful poultry management, M. A. Jull *(New York and London: McGraw-Hill Book Co., [1943], pp. 467+, illus. 201)*.—There are presented descriptions of the better poultry husbandry practices and marketing methods for meat and eggs. Nearly half of the book gives special attention to breeding and housing superior stock. Two chapters deal with poultry feeding and a like number with marketing eggs and chickens.

Backyard poultry keeping, G. T. Klein *(Hanover, Pa.: Everybodys Book Pub. Co., 1943, pp. 144, illus. 77)*.—A practical and explicit outline of housing, feeding, and management of a small flock of poultry.

Backyard poultry keeping, J. C. Taylor *(New Brunswick, [N. J.]: Rutgers Univ. Press, 1943, pp. 147+, illus. 23)*.—A popular book, with an introduction by W. H. Allen, on principles of poultry production, with special reference to the small flock.

Capon production, L. F. Payne *(Kansas Sta. Bul. 315 (1943), pp. 35, illus. 17)*.—Directions are given in this revision of Bulletin 274 (E. S. R., 76, p. 89) for caponizing cockerels at 6 to 8 weeks of age. A flock of 100 Plymouth Rock capons averaging 7.07 lb. in weight at 32 weeks of age consumed 7.22 lb. of feed per pound of gain. A group of 50 Rhode Island Red capons averaged 8 lb. at 8 mo. of age and consumed 7.26 lb. of feed per pound of gain. The selling price of capons exceeded that of turkeys and roasters. There was no benefit from caponizing turkeys or guineas.

Conservation of animal protein in chick rations, H. H. Scott, T. B. Avery, and L. D. Matterson. ([Conn.] Storrs Expt. Sta.). *(Flour & Feed, 43 (1943), No. 12, pp. 32–33)*.—Chicks made normal growth and utilization of feed up to 8 weeks of age on rations containing 20 percent protein of which 10 percent or more was from meat scrap and fish meal. As the sole protein supplement, soybean meal resulted in reasonably good growth, but the efficiency of feed utilization was inferior. The study was conducted with 6 lots of about 25 chicks each, receiving 0, 2, 5, 10, 20, and 32 percent protein from animal sources and 20 percent soybean meal. In other experiments, as little as 1.3 percent of the protein from dried milk was a more efficient supplement to the high soybean ration than 3.5 percent meat scrap and fish meal. Another sample of skim milk powder gave less favorable results, probably because of a greater destruction of cystine or other amino acids in the drying process.

The effect of added cystine in purified rations for the chick, G. M. Briggs, Jr., R. C. Mills, C. A. Elvehjem, and E. B. Hart. (Wis. Expt. Sta.). *(Jour. Biol. Chem., 144 (1942), No. 1, pp. 47–52)*.—In further studies of the nutritive requirements of the chick (E. S. R., 88, p. 660), at least 0.3 percent of cystine or its equivalent of methionine was required by the chick for maximum growth to 4 weeks of age. Without arginine and glycine supplements to the basal ration of 18 percent casein, cystine supplements were ineffective. These amino acids and chondroitin helped prevent gizzard erosion but had no growth-promoting value. The combination of arginine, glycine, chondroitin, and cystine constitute the cartilage growth factor and may be substituted for cartilage in the prevention of gizzard erosion.

Studies of milk as the sole constituent in the diet of the chick, T. D. Luckey, G. M. Briggs, Jr., C. A. Elvehjem, and E. B. Hart. (Wis. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 4, pp. 299–300, illus. 1*).—Continuing the above studies, growth and feathering were improved and paralysis disappeared when the rations of chicks fed to 4 weeks of age were supplemented with 1 percent arginine, 3 percent glycine, and 0.5 percent cystine. The basic ration consisted of whole milk powder, minerals, 5 percent grit, 4 percent solubilized liver, and vitamins A, D, and E. The studies were conducted with lots of about six chicks each on rations of dried milk supplemented with part or all of the above substances.

Relation of milk, cholesterol and estrogens to cholic acid formation in chicks, H. J. Almquist, E. Mecchi, and F. H. Kratzer. (Univ. Calif.). (*Soc. Expt. Biol. and Med. Proc., 52 (1943), No. 4, pp. 296–297*).—Confirming a previous report that milk products led to an increased level of cholic acid production in the bile and the prevention of gizzard erosion (E. S. R., 86, p. 231), liquid buttermilk, whey, and protein-free milk supplements produced over 150 mg. of cholic acid per gram of dried bile in chicks. Thus the greater part of the cholic acid-producing activity remains in milk even after separation of the proteins, and the activity was resistant to heat. Cholic acid-producing activity was not shown in chicks receiving the oestrogen fraction from whey or by cholesterol, oestriol, or diethylstilboestrol.

Studies on two chemically unidentified water-soluble vitamins necessary for the chick, G. M. Briggs, Jr., T. D. Luckey, C. A. Elvehjem, and E. B. Hart. (Wis. Expt. Sta.). (*Jour. Biol. Chem., 148 (1943), No. 1, pp. 163–172*).—The presence in liver, as noted by Mills et al. (E. S. R., 88, p. 669), of a factor distinct from folic acid and needed for normal feather growth was demonstrated in 23 lots of from 5 to 30 chicks in 4-week experiments on purified rations with supplements of liver substances and grass juice. Both factors were soluble in water, adsorbed on norit and Superfiltrol at pH 3, eluted with a mixture of water, alcohol, and ammonia, and separated partially by fractional precipitations with ethyl alcohol. The factors are named vitamin B_{10} for feather development and B_{11} for growth.

Shark liver oil a source of vitamins A and D in poultry nutrition, L. L. Rusoff and N. R. Mehrhof (*Florida Sta. Bul. 385 (1943), pp. 14, illus. 1*).—A more detailed account of investigations previously noted (E. S. R., 88, p. 798).

Distillers' dried solubles as a vitamin supplement in chick rations, R. E. Synold, C. W. Carrick, R. E. Roberts, and S. M. Hauge. (Ind. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 4, pp. 323–329, 336*).—Distillers' dried solubles was found to be a good source of water-soluble vitamins and a valuable supplement to corn and soybean meal for chicks. It could replace all of the dried skim milk in the starting rations of broilers or pullets, although it was previously found that casein contained a distinctive growth factor (E. S. R., 87, p. 697). In one experiment a broiler starting ration containing 6 percent distillers' dried solubles was slightly more efficient based on feed required per unit of gain by broilers than a ration containing 5 percent of dried skim milk. Distillers' dried solubles did not contain all the growth factors of meat and bone scrap since a reduction from 5 to 2 percent in the meat and bonemeal was not sufficiently replaced by the dried solubles in the stimulation of growth in pullets. A reduction of alfalfa meal from 5 to 2 percent in rations of dried solubles and meat and bone scrap retarded growth of the chicks, thus indicating that alfalfa contained growth factors not supplied by meat and bone scrap or dried solubles. The studies were conducted with 19 lots of from 24 to 40 chicks of both sexes fed to 6 and 8 weeks of age on rations mainly of yellow corn and soybean meal with supplements of different combinations of the protein sources, vitamins, and minerals.

Miscellaneous observations on the A. O. A. C. vitamin D assay, J. C. Fritz and H. R. Halloran (*Poultry Sci*, 22 (1943), No. 4, pp. 314–322, illus. 1).—A résumé of assays for vitamin D, involving about 70,000 chicks, showed that the ideal basal diet for assay would be one adequate in all respects except vitamin D and would permit optimum growth and development when supplemented with vitamin D. Good calcification with little vitamin D was undesirable. Calcification was influenced by both the amounts and ratio of Ca and P. Following experiments with several diets, the best and most consistent results were obtained with a relatively simple mixture of ground yellow corn 77 percent, wheat bran 5, casein 12, yeast 2, meat scrap 1, tricalcium phosphate 2, iodized salt 1, and $MnSO_4.4H_2O$ 0.2 percent. Sources of the vitamin B–G complex were influencing factors on bone ash when supplements of yeast, condensed whey solubles, and butyl alcohol residue were employed. There was a general increase in the weight of chicks with increasing levels of vitamin D in the feed. In the preparation of bone samples, either the removal of cartilage caps or the cooking of leg sections for 4 min. saved time for the assays. Crushing the tibias showed that the ash content was increased over that of uncrushed bone. A number of fat solvents were compared. Ashing green bones permitted as accurate interpretation of assays as ashing dry bones, but 1 hr. at 850° F. may not be adequate for large bones.

Further experiments on creatine formation in the chick, H. J. Almquist, F. H. Kratzer, and E. Mecchi. (Univ. Calif.). (*Jour. Biol. Chem.*, 148 (1943), No. 1, pp. 17–20).—Employing methods previously described (E. S. R., 88, p. 237), injections of 1 cc. of a 5-percent solution of creatinine into the breast muscle of chicks increased both the rate of gain and the muscle creatine much as previously reported for dietary creatine. In other experiments feeding hydantoic acid caused no appreciable difference in the creatine content of the tissues. On the other hand glycocyamine caused a large increase in muscle creatine. Choline and methionine, singly and combined, had little effect on the muscle creatine content of chicks.

Cowpea-hay meal in chicken rations, P. J. Serfontein (*Farming in So. Africa*, 18 (1943), No. 205, pp. 295–299, illus. 3).—Cowpea-hay meal could replace alfalfa meal as 8 to 10 percent in chicken rations up to 10 weeks of age. The flavin and pantothenic acid content of cowpea meal depends, as in alfalfa meal, on the stage of cutting, method of drying, and percentage of leaves present. Lots of 50 chicks of mixed sexes averaged in weight, for cockerels and pullets at 10 weeks of age with 8 percent alfalfa meal, 1.99 and 1.73 lb., respectively. When the ration contained 8 percent cowpea meal the weights were 2.18 and 1.88 lb. With 12, 16, and 20 percent cowpea meal, the average weights were nearly as good. Perosis and cannibalism did not occur with the larger amounts of the roughage.

Amorphous calcium metaphosphate as a phosphorus supplement for chicks, H. R. Bird and C. D. Caskey, Jr. (Md. Expt. Sta. et al.). (*Poultry*

Sci., *22* (*1943*), *No. 4*, *pp. 333–334*).—Phosphorus was effectively utilized by chicks receiving supplements of calcium phosphate to a basal ration of ground corn, wheat, ground oats, and other materials. In general there were over 2.70 gm. of fat-free dry bone per 100 gm. of chicks regardless of whether the supplements to the groups of 20 chicks each were $Ca_3(PO_4)_2$, $Ca(PO_4)_2$, or $Ca(PO_3)_2$ of which portions had been passed through a 100-mesh sieve.

Crab meal in poultry rations.—I, Nutritive properties, J. A. Lubitz, C. R. Fellers, and R. T. Parkhurst. (Mass. Expt. Sta.). (*Poultry Sci.*, *22* (*1943*), *No. 4*, *pp. 307–313*).—From a chemical analysis, crab meal was shown to be an animal protein concentrate of high mineral content. In experiments with rats, crab meal was a fair source of riboflavin, contained less than 1 International Unit of vitamin A per gram, and thiamin and vitamin D were not present in significant amounts. The average availability of the crude protein ascertained with rats was 84.5 percent. The protein had a biological value of 76 percent of that of casein for rats and 59 percent for chickens. Chitin and glucoseamine HCl, formed from chitin on hydrolysis, were of no protein supplementary value for chicks.

Nutritive value of keratins.—I, Powdered swine hoofs, J. R. Wagner and C. A. Elvehjem. (Wis. Expt. Sta.). (*Soc. Expt. Biol. and Med. Proc.*, *51* (*1942*), *No. 3*, *pp. 394–396*).—Carrying further the study by Routh (E. S. R., 88, p. 545) of the utilization and nutritive properties of fibrous animal byproducts, it was found that evidently rats and chickens can digest and utilize the protein of powdered hoofs but it was inadequate for rats at from 18 to 20 percent levels. When the rations consisted of 30 percent of powdered hoofs, rats made average gains of 3.2 gm. per day, which were practically equal to those of rats on from 18 to 20 percent casein rations. With chicks, rations containing 24 percent powdered hoofs produced average weights of 121 gm. at 4 weeks of age. Chicks receiving equal amounts of casein did not grow as well and they were not so well feathered as those receiving the powdered hoof supplements.

The nutritive value of keratins.—II, Powdered swine hoofs in poultry rations, J. R. Wagner and C. A. Elvehjem. (Wis. Expt. Sta.). (*Poultry Sci.*, *22* (*1943*), *No. 4*, *pp. 275–276, 290*).—In further studies of the subject noted above, powdered pig and swine hoofs were a satisfactory substitute for meat scrap and fish meal in practical rations of day-old chicks. The average body weight of groups of six chicks each at 4 weeks of age, on a low protein ration with 8 percent skim milk powder was increased from 107 to 187 gm. by the addition of 8 percent powdered hoofs and to 170 gm. with 4 percent meat scrap and 4 percent powdered hoofs, and from 93 gm. with 5 percent skim milk powder to 154 gm. by the addition of 7.5 percent powdered hoofs, 150 gm. with 5 percent soybean meal, 208 gm. with 5 percent each of meat scrap, fish meal, and soybean meal, or about 200 gm. with two and three of these proteins. The keratin proteins may be of particular value for animals producing quantities of keratin tissue such as feathers.

Methods of feeding grain to laying pullets, N. R. Mehrhof, E. F. Stanton, and D. F. Sowell (*Florida Sta. Bul. 380* (*1942*), *pp. 27*).—From the similarity of the results obtained in feed consumption and egg production by 4 lots of from 40 to 48 pullets self-fed mash with grain mixtures hand-fed in the litter in the evening, hand-fed in a hopper in the evening, hopper-fed ad libitum, or when corn, wheat, and oats of the grain mixture were separately fed in hoppers, it appeared that any of these methods might be recommended for laying pullets. The tests were conducted in a comparable manner for 2 yr. at the main station with Rhode Island Reds without moist mash and at the Florida National Egg-Laying Test with Rhode Island Reds the first year and New Hampshires the second, both with moist mash. No artificial lights were used at the main station, but they were employed at the egg-laying test, and under these conditions the best results were obtained with the lot which had mash self-fed and grain fed in the litter once each evening.

Conservation of feedstuffs through turning pullets on pasture, J. A. Davidson, H. C. Rather, and C. G. Card (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 324–329, illus. 1*).—In 3 years' comparisons with ¼-acre pasture plats of different grasses (alfalfa; alfalfa and smooth bromegrass; Kentucky bluegrass; alfalfa, smooth brome, and Chewings fescue; oats and rape; and perennial ryegrass, tall oatgrass, smooth brome, and reed canary grass), a growing mash seemed essential for pullets during the entire growing season to obtain satisfactory results under practical conditions. A good pasture, however, resulted in a saving of 10–20 percent of the mash. Plants somewhat drought-resistant were most useful.

The effect of certain dietary factors on gastric hydrogen ion concentration and acidity in the domestic fowl, D. S. Farner. (Univ. Wis.). (*Poultry Sci., 22 (1943), No. 4, pp. 295–298*).—Fluid removed from the gizzards of live birds by a spinal puncture needle according to methods described in a previous contribution by the author (E. S. R., 88, p. 803) showed the pH of the gastric juice to be lowered significantly by the addition of calcium carbonate as limestone grits or bonemeal and of high protein feeds such as fish meal, meat meal, and soybean meal to the basic ration. The free HCl in the fluid was also reduced, but total acidity was unaffected. Protein digestion was possibly affected by the reduced pH. Groups of 20–27 Rhode Island Reds and Barred Plymouth Rock hens were fed on rations of ground corn; ground corn, bran, and middlings; ground corn, ground oats, middlings, and bran; and ground corn, bran, middlings, and protein supplements of alfalfa meal, soybean meal, dried milk, meat scrap, fish meal, and minerals and cod-liver oil.

An attempt to shorten the molt and to stimulate egg production by the feeding of methionine, M. W. Taylor and W. C. Russell. (N. J. Expt. Stas.). (*Poultry Sci., 22 (1943), No. 4, pp. 334–336*).—The feeding of 70 mg. of *dl*-methionine per day to six molting hens did not shorten the molting period or influence egg production, as compared with six comparable hens which received no methionine supplements.

Influence of increased light on progress of molt and egg production in yearling Rhode Island Red hens, G. M. Riley and T. C. Byerly. (U. S. D. A.). (*Poultry Sci., 22 (1943), No. 4, pp. 301–306, illus. 1*).—The progress of molting in Rhode Island Red hens was not affected by lighting 14 hr. per day from December 1 to March 1, although the egg production rate was increased over that of hens exposed to normal environmental conditions. In 97 lighted hens, egg production rose steadily from the second week until a peak of 47.9 percent was reached during the fifth week. Another peak of 67.9 percent was obtained in egg production in the tenth week following a cold spell which retarded egg production. In the 97 unlighted hens, egg production was less than 15 percent throughout the first 10 weeks. The molt of the wing primaries progressed at virtually the same rate in both groups.

Stabilizing quality in shell eggs, E. M. Funk (*Missouri Sta. Res. Bul. 362 (1943), pp. 38, illus. 10*).—A more complete account of investigations previously noted from another source (E. S. R., 89, p. 240).

Pasteurization of shell eggs, E. M. Funk (*Missouri Sta. Res. Bul. 364 (1943), pp. 28, illus. 2*).—Most, and possibly all, of the bacteria that cause spoilage in shell eggs held in cold storage may be destroyed by pasteurization at 140° F. for 10 min. The marketable quality of the eggs was maintained with constant rotation. To determine the effectiveness of the treatment, eggs were wiped with cultures or viable cultures were injected into the albumen. The process was not effective against molds. Bacterial growth was obtained from the unpasteurized eggs. Organisms, known to cause egg spoilage, which were destroyed by the pasteurization were: *Aerobacter aerogenes*, *Alcaligenes bookeri*, *A. faecalis*, *Eberthella oedematiens*, *E. oxyphila*, *Escherichia coli*, *Flavobacterium aurescens*, *Proteus ichthyosmus*, *P. mirabilis*, *P. vulgaris*, *Pseudomonas fluorescens*, *Serratia marcescns*, *Staphylococcus albus*, and *S. aureus*.

The production, feeding, and care of rabbits, C. L. Shrewsbury and J. D. Hatfield (*Indiana Sta. Cir. 283 (1943), pp. 6, illus. 3*).—General directions for feeding, care, and housing of rabbits.

DAIRY FARMING—DAIRYING

Growth and development, with special reference to domestic animals.—LVI, The influence of dairy merit, body size, and plane of nutrition on the economy of milk production, S. Brody (*Missouri Sta. Res. Bul. 366 (1943), pp. 31, illus. 5*).—Continuing this series (E. S. R., 88, p. 320), the economy of milk production was expressed as the dairy merit ratio, which is the relation of the energy of milk produced to the total digestible nutrients consumed. The dairy merit proved to be independent of live weight (W). The upper limit of the dairy merit ratio was 50 percent in rats, goats, cows, and even humans. It is suggested that the dairy value of cattle may be estimated by the ratio of FCM (fat corrected milk (4 percent)) to $W^{0.7}$ or by the dairy merit ratio. Estimates of the numerical values of the dairy merit for various live weights and milk production were computed from the equation $\frac{61\ \mathrm{FCM}}{\mathrm{FCM}+0.173W^{0.73}}$. The concept is advanced that the lactationally effective body size is related to the potential dairy profit somewhat as the Babcock butterfat test is related to the dairy cattle improvement and potential dairy profit. If dairy merit and other conditions are equal, the monetary profit per unit of milk produced per cow and for the herd increases rapidly with increasing size of cow. However, other conditions are not equal. Differences in the maintenance costs required by cattle and other animals of different sizes varied with body surface or the weight to the ⅝ power. With the principles and methods relating dairy merit, live weight, and plane of production to milk yield, labor costs, and profit, the problem is how to apply and modify these findings to modern conditions. Smoothed data for production of milk of different fat percentages by animals of different weights are presented from many sources.

The family dairy cow, H. C. Henderson and G. Heebink (*West Virginia Sta. Cir. WS 14 (1943), pp.* [8]).—A popular account of the practical selection and feeding of the family cow and caring for milk products.

Milk and milk products, C. H. Eckles, W. B. Combs, and H. Macy (*New York and London: McGraw-Hill Book Co., 1943, 3. ed., pp. 413+, illus. 92*).—A revision of the book previously noted (E. S. R., 76, p. 843).

Emergency use of the laboratory during the war: Use of the thermoduric test, with special reference to a new rapid method, W. L. Mallman and C. S. Bryan (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, p. 386*).—An autoclaved slide test for thermoduric bacteria is referred to as simple to perform and offering a quick method of screening the undesirable from the acceptable milk samples.

Centrifugal separation of homogenized milk, G. M. Trout and M. V. Scheid (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 366–374, illus. 1*).—When different portions of homogenized and nonhomogenized milk were mixed for centrifugal separation at different temperatures, including freezing and after various periods of holding, no very satisfactory method was found for the separation. These results were based on the fat found in the skim milk. Methods of heat treatment known to be conducive to fat clumping in nonhomogenized milk were of little value. Separation was most efficient at 140° F. The butyl alcohol method of testing skim milk from homogenized milk seemed to be more reliable than the Babcock test. About 50 percent of the fat was recovered from milk homogenized at 2,500-lb. pressure.

Some factors affecting the mold content of cream and the mycelia count of butter, T. J. Claydon (*Arkansas Sta. Bul. 432* (*1943*), *pp. 36*, *illus. 7*)—Though various factors may increase the mold content of cream, the only satisfactory method of producing a suitable product for consistent low count butter making seemed to be through the practice of scrupulous sanitation, efficient cooling, and frequent delivery. Of 57 producers delivering cream to the University of Arkansas creamery, 43.9 percent used mechanical separators and 33.3 percent water diluters, and 22.8 percent skimmed the cream by hand. For cooling the cream, 22.8 percent used household refrigerators and 26.3 percent flowing water, and 50.9 percent held the cream in cellars, on porches, or in caves, or made no special provision for cooling. Although there was a general relationship between the grade of cream and its mold content, numerous exceptions existed. General relationships were also found between the mold content of the cream and the size of delivery, fat content, and acidity of the cream. Mold growth occurred mainly at the surface of the cream, but it did not appear to be affected by differences in humidity. Mold growth was more rapid at 80°–85° F. than at 40°–45°. Mold content was generally high in stirred and mixed cream and was lowered by subsurface additions of cream followed by surface removal of the mold. Samples of cream as small as 4 oz. were unsatisfactory because only major differences could be detected. Mold counts on experimental butters were usually markedly lower than in commercial butter. The mold filaments were longer and less evenly distributed in experimental butter, presumably because of the greater working and therefore shorter filaments in commercial butter. Mold counts were made on the cream samples and butter by the Wildman methylene blue-borax test as modified by Parsons (E. S. R., 85, p. 244). Studies of the effect of neutralization and pasteurization of the cream on mold counts were also included.

Water supplies of butter manufacturing plants, R. T. Corley, H. F. Long, and B. W. Hammer (*Iowa Sta. Res. Bul. 319* (*1943*), *pp. 749–794*).—Detailed bacteriological examination of water supplies of 70 Iowa dairy manufacturing plants revealed much variability in the kind and numbers of organisms present on nutrient agar as prepared by Wolman et al. (E. S. R., 76, p. 203) and on tryptone-glucose-extract agar (T. G. E. M.) to which had been added sterile skim milk and fat emulsion. Differences in the organisms present were traced to lack of sanitation in storage tanks and butter spoilage organisms. When the wash water for butter contained coliform organisms they were found in the unsalted and salted product. Many of the positive samples containing coliform organisms had total counts (T. G. E. M. agar, 96 hr. at 21° C.) in excess of 100 per cubic centimeter and produced spoilage in experimental butter. Certain water samples produced *Pseudomonas fragi*, *P. graveolens*, and *P. mephitica*, known to cause butter deterioration.

Quince seed extract as an ice cream stabilizer, G. Hadary and H. H. Sommer. (Wis. Expt. Sta.). (*Ice Cream Rev.*, *26* (*1943*), *No. 11*, *pp. 22–25*).—The stabilizing properties of 0.032 percent quince seed water added to a 12-percent ice cream mix were comparable to those of 0.32 percent 225 Bloom gelatin. The action of quince upon the stabilizing properties of the mix viscosity was immediate, whereas the viscosity of the gelatin-stabilized mix increased with age. Both gelatin and quince stabilizer were completely incorporated at ordinary pasteurization temperatures. The addition of less than 0.03 percent (0.01, 0.015, 0.02 and 0.025) of quince decreased the viscosity, but the viscosity increased with 0.03, 0.04, and 0.05 percent quince or 0.3 and 0.4 percent gelatin. When the viscosities of mixes stabilized for different periods up to 48 hr. were compared, both gelatin and quince stabilizers decreased the time required to produce 100 percent overrun. There was little difference in the effects of gelatin and quince on the body and flavor, but the melt-down characteristics of the ice cream stabilized with quince solution did not compare favorably with that made with gelatin. In general, results with 10, 14, and 16 percent mixes agreed with the findings with the 12 percent mix.

VETERINARY MEDICINE

Observations on the fate of phenothiazine in domestic animals, H. B. Collier, D. E. Allen, and W. E. Swales (*Canad. Jour. Res., 21 (1943), No. 6, Sect. D, pp. 151–159*).—Report is made of the results of an investigation of the fate of phenothiazine in sheep, horses, dogs, rabbits, and pigs, based upon identification of the urinary excretion products, which was facilitated by chromatographic analysis and observation of absorption spectra. In the sheep the drug is oxidized in the rumen and is excreted as leucophenothiazone conjugated with sulfuric acid. Horses and dogs also excrete leucophenothiazone, whereas rabbits excrete mainly leucothionol, all in conjugated form. The urine of pigs, after acidification, contains free phenothiazine, with smaller amounts of thionol and phenothiazone. These observations on the fate of phenothiazine indicate no fundamental difference between herbivorous and other animals.

Some of the more recent aspects of the toxicology of selenium, M. I. Smith (*6. Pacific Sci. Cong., Calif., 1939, Proc., vol. 6, pp. 167–176, illus. 5*).

The poisonous plant problem in the Southeastern States, E. V. Smith (Ala. Expt. Sta.). (*North Amer. Vet., 24 (1943), No. 6, pp. 345–353, illus. 5*).—This discussion is presented with a list of 21 references to the literature.

A study of bacterial occurrence, W. G. Walter and G. J. Hucker. (N. Y. State Expt. Sta.). (*Soap and Sanit. Chem., 17 (1941), No. 8, p. 101*).

A study of the complement-fixation test as applied to chicken plasma, S. M. Morrison and S. E. Hartsell. (Purdue Univ.). (*Jour. Bact., 45 (1943), No. 4, pp. 413–414*).

Brucellosis in man and animals, I. F. Huddleson et al. (*New York: Commonwealth Fund, 1943, rev., pp. 379+, illus. 43*).—A revised edition (E. S. R., 82, p. 533). The bibliography has been increased to 485 titles.

The influence of biotin upon susceptibility to malaria, W. Trager (*Jour. Expt. Med., 77 (1943), No. 6, pp. 557–582, illus. 15*).—The author found biotin-deficient chickens and ducks to develop much more severe infections with *Plasmodium lophurae* than did nondeficient control animals. "While a very mild degree of biotin deficiency sufficed to increase susceptibility, even an extreme degree of pantothenic acid deficiency had no effect. Biotin deficiency also increased the susceptibility of ducks to *P. cathemerium*. In animals infected with *P. lophurae* the concentration of biotin in the plasma as well as in the red cells rose during the course of the infection, reached a peak at about the same time as the parasite number reached its peak, and then returned to normal as the infection subsided. While the administration of additional biotin to animals partially deficient in biotin could be considered a specific measure tending to lessen the severity of infection with *P. lophurae*, the injection of biotin into animals fed a diet adequate in this vitamin had no antimalarial effects, perhaps because the excess biotin was rapidly removed from the blood."

Recovery of equine encephalomyelitis virus (western type) from human spinal fluid in Alberta, R. GWATKIN and I. W. MOYNIHAN (*Canad. Jour. Pub. Health, 34 (1943), No. 4, pp. 166–170*).

Venezuelan equine encephalomyelitis in man, J. CASALS, E. C. CURNEN, and L. THOMAS (*Jour. Expt. Med., 77 (1943), No. 6, pp. 521–530*) —Report is made of the isolation of a filtrable agent from the blood and washings of the upper respiratory passages of a young laboratory worker during a mild, acute, febrile illness, identified as a strain of Venezuelan equine encephalomyelitis virus.

The treatment of outbreaks of haemonchosis, H. M. GORDON, I. W. MONTGOMERY, and L. K. WHITTEN (*Jour. Council Sci. and Indus. Res. [Austral.], 15 (1942), No. 3, pp. 200–206, illus. 2*).—In the work reported the great value of phenothiazine in the control of hemonchosis under outbreak conditions was shown, and the shortcomings of carbon tetrachloride and copper sulfate-nicotine mixture were demonstrated. Successful control of hemonchosis under outbreak conditions requires repeated treatments. Anthelmintics which depend for their efficiency upon copper sulfate bringing about direct passage into the abomasum should be alternated with carbon tetrachloride.

Infection of laboratory animals with Mycobacterium johnei, J. FRANCIS (*Jour. Compar. Pathol. and Ther., 53 (1943), No. 2, pp. 140–150, illus. 4*).—"Four mice, 14 days old, were each given intraperitoneally 2.5 mg. moist bacilli from a culture of *M. johnei*. They were reinoculated with the same dose 7 days later. Post-mortem examinations were carried out 9 to 34 weeks after inoculation and showed that a progressive infection commencing in the liver and spleen and eventually involving almost the whole of the intestinal tract had developed. Seven mice, 13-day-old, received liver tissue from one of these infected mice. The bacilli multiplied in the second group of mice more rapidly than in those originally inoculated. The results of a second mouse passage were largely vitiated due to the early death of the inoculated mice. Another group of 13-day -old mice was inoculated with a total dose of 1.4 or 1.25 mg. of culture from the spleen of an infected mouse. Three of these mice rapidly became heavily infected, but two, killed later, were negative and a third was only lightly infected. Slight infection was also produced in young hamsters, but on the basis of their weights the doses they received were approximately three times smaller than those given to mice. The results were less consistent, but bacilli were carried through one direct animal passage. The cellular reactions in infected mice and hamsters were similar to those in naturally completed Johne's disease. In this study young rabbits and guinea pigs appeared to be less susceptible to Johne's disease than mice or hamsters."

Relapsing fever: The tick Ornithodoros turicata as a spirochetal reservoir, G. E. DAVIS (*Pub. Health Rpts. [U. S.], 58 (1943), No. 22, pp. 839–842*).—Report is made of a quantitative study of the transovarial transmission of spirochetes through five generations of *O. turicata*. Progeny found to be infective in each of the five generations amounted to 16 ticks (35 percent), 55 (96 percent), 66 (100 percent), 107 (47 percent), and 136 ticks (100 percent), respectively. These results indicate that the tick itself may be a more efficient "spirochetal reservoir" than the rodent host.

Nomenclature of the pathogenic rickettsiae, C. B. PHILIP (*Amer. Jour. Hyg., 37 (1943), No. 3, pp. 301–309*).—A check list of the rickettsiae pathogenic for man and associated with arthropod vectors, based on the account given, and a list of 38 references to the literature cited are included.

The state of the Salmonella problem, S. Bornstein (*Jour. Immunol., 46 (1943), No. 6, pp. 439–496*).—This review is accompanied by a list of 378 references to the literature cited.

Notes on tetrathionate broth and MacConkey's agar media in the isolation of Salmonella enteritidis var. dublin from bovine faeces and milk, K. M. Massey (*Jour. Compar. Pathol. and Ther., 53 (1943), No. 2, pp. 151–156*).—In work conducted during the course of an outbreak in calves caused by *S. enteritidis dublin*, tetrathionate broth was found to give a pure heavy growth of the organism from infected bovine feces and milk when the infecting organism was present in very small numbers. The smallest number of organisms per cubic centimeter of artificially infected feces suspension to be detected by the use of tetrathionate broth varied from approximately 15 to 1. MacConkey plates spread directly from infected feces and milk usually require an infection 5 or 10 times heavier to be present before they will detect the organism. In these cases only a few *Salmonella* colonies may be present, and these may well be overgrown by the normal flora of the feces. The smallest number of organisms per cubic centimeter of feces suspension to be detected by direct plating on MacConkey medium varied from approximately 255 to 15. A much larger quantity of feces or milk may be inoculated into a tube of tetrathionate broth than can be spread on a plate, thereby increasing the chances of recovering the organisms.

Rocky Mountain spotted fever: Spontaneous infection in the tick Amblyomma americanum, R. R. Parker, G. M. Kohls, and E. A. Steinhaus (*Pub. Health Rpts. [U. S.], 58 (1943), No. 19, pp. 721–729*).—Record is made of the recovery of rickettsia of Rocky Mountain spotted fever from a lot of 114 unfed lone star tick nymphs collected near Weathers, Okla., in September 1942. This proof of the spontaneous occurrence of the spotted fever rickettsia in this tick, together with accumulated suggestive case data, is considered to establish the lone star tick as the third species of tick transmitting spotted fever to man in the United States. Old and recent case data suggestive of the transmission of spotted fever by this tick are discussed.

Tularemia: Spontaneous occurrence in shrews, G. M. Kohls and E. A. Steinhaus (*Pub. Health Rpts. [U. S.], 58 (1943), No. 22, p. 842*).—Record is made of the occurrence of tularemia in the shrew (*Sorex vagrans monticola*) and in the field mouse (*Microtus pennsylvanicus modestus*), as demonstrated in connection with field studies of this disease by the Rocky Mountain Laboratory.

Murine typhus fever control, C. R. Eskey (*Pub. Health Rpts. [U. S.], 58 (1943), No. 16, pp. 631–638*).—A discussion of the control of this disease based upon the eradication of rodent reservoirs of infection, since most of the cases of human infection with the rickettsiae of murine typhus are traceable to typhus-infected domestic rats.

Isolation of Corynebacterium pyogenes from a fetus and later from the mammary gland of the dam (a case report), W. L. Boyd and M. D. Kelly. (Minn. Expt. Sta.). (*Jour. Amer. Vet. Med. Assoc., 103 (1943), No. 796, pp. 24–25*).—Report is made of the presence of *C. pyogenes* in the heart, lung, liver, and spleen of a 7-month-old aborted fetus and some 5 mo. later in the uterus and right hind quarter of the udder of the dam, the teat of which had been severely traumatized by treading. The infection is thought to have gained entrance to the mammary gland through the traumatized tissues.

The Hotis test for the detection of mastitis bacteria in milk, W. T. Miller (*U. S. Dept. Agr. Cir. 672 (1943), pp. 7, illus. 1*).—The importance that other species of *Streptococcus* than *S. agalactiae* have attained since the rapid method of detection known as the Hotis test was first described in 1936 (E. S. R., 76, p. 391) and variations in agreement between this test and the blood-agar method led the author to undertake additional studies of the efficiency of the Hotis test. These studies, involving 10,000 to 15,000 milk samples. revealed the test to be 85 to 90 percent as efficient as cultures on blood-agar plates for detecting *S. agalactiae* in milk. This species was detected more readily than other species that cause mastitis. Only a small percentage of milk samples containing *S. dysgalactiae* and *S. uberis* were positive by the Hotis test. *Staphylococcus aureus*, the most important of the staphylococci causing the disease, is readily identified. This circular describes and illustrates some of the more common changes resulting from *S. agalactiae* and *S. aureus*. These two species can be distinguished by differences in color of samples and of flakes in the milk. It is concluded that as *S. agalactiae* is the usual cause of mastitis and since the form of the disease caused by this species is the only one on which information on control and treatment is available, failure of the Hotis test to detect other species is not a serious objection.

The interpretation of the results of the microscopic test for infectious mastitis, C. S. BRYAN, H. H. RUHLAND, and R. E. HORWOOD (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 314–318, illus. 2*).—An explanation of the test.

Incidence of mastitis minimized, D. L. FOURT, F. C. FOUNTAINE, G. C. HOLM, and V. A. CHERRINGTON (*Idaho Sta. Bul. 251 (1943), pp. 19–20*).—Research work and long experience with the station herd has led to the development and adoption of practices that have given satisfactory results in mastitis control. These include regular laboratory tests every 2 mo. on composite samples of milk from each cow, elimination of infected cows and replacement with noninfected heifers, segregation of infected and noninfected cows, milking noninfected cows first, addition of an extra head and teat cup assembly to the milking machine equipment (which permits immersion of each set in a chlorine solution for 2 min. between milkings), and the application of short-wave diathermy to the udder for 1 hr. daily as soon as possible after a cow is reported to have a hard, swollen, or congested udder.

In continuation of the study to control mastitis with various types of chemicals, the treatment of 15 cows in various stages of lactation, including dry cows, resulted in the freeing of the infection from 11 and no improvement in 4. The best results were secured when cows were treated during the dry period. Several of the cows which became negative after treatment later became reinfected, and 4 cows failed to return to normal production in the lactation period during which they were treated. Preliminary trials with homogenized sulfanilamide gave every evidence of very satisfactory results.

Comparative value of brains and cords of sheep in rabies vaccine, G. L. DUNLAY (*Jour. Amer. Vet. Med. Assoc., 103 (1943), No. 796, pp. 11–14*).—Brain tissue from sheep inoculated with rabies fixed virus has been found to contain 100 times or more virus than cords from the same animals. There appears to be quite a wide variation in virus content of different individual animals, even though handled under similar conditions. Vaccine prepared from sheep cords alone has little or no immunizing value when tested in mice 6 mo. after harvesting. Vaccines prepared from sheep brains alone and from mixtures of brains and cords have a high immunizing value under the conditions of these tests. Vaccines prepared from sheep brains and cords contain approximately 28 percent of material (cords) having no immunizing value when 6 mo. of age and kept under proper storage. These tests also seem to confirm the relationship between original virus content and immunizing potency.

The anthelmintic efficiency of phenothiazine against immature Trichostrongylus spp. in sheep, H. M. GORDON (*Jour. Council Sci. and Indus. Res. [Austral.], 16 (1943), No. 1, pp. 1–4*).—Tests conducted with a group of 5-month-old sheep have shown phenothiazine to be considerably less efficient in killing immature *Trichostrongylus* spp. than in killing the mature parasites. Under active outbreak conditions where continuous reinfestation is taking place, treatments must be repeated in order to effect early control.

, **The eradication of sheep ticks, Melophagus ovinus, by one dipping in dilute derris-water or cube-water dips,** N. G. Cobbett and C. E. Smith. (U. S. D. A.). (*Jour. Amer. Vet. Med. Assoc., 103 (1943), No. 796, pp. 6–10, illus. 3*).—In field tests here reported the sheep tick was completely eradicated from a number of infested farm and range flocks by one dipping in freshly prepared dips consisting of 4 or 6 oz. of either derris powder or cube powder per 100 gal. of water. The use of 6 oz. is preferable, in that a more rapid eradication is obtained and a more satisfactory margin of efficacy is provided. The dip materials were lethal to the existing sheep ticks and apparently stayed in the fleeces of the dipped sheep sufficiently long to destroy any young ticks that emerged from pupae remaining in the wool after dipping. The presence of the dip materials in the fleeces of the dipped sheep apparently prevented reinfestation from infested premises. Evidence was found to show that the dip materials destroyed numerous embryo sheep ticks within their pupa cases.

Some observations on the stability of lime-sulphur during dipping, J. L. Hill (*Jour. Council Sci. and Indus. Res. [Austral.], 15 (1942), No. 3, pp. 207–210*).—Report is made of observations on the stability of lime-sulfur during the course of a dipping trial in which 10,000 sheep were dipped in a diluted lime-sulfur dip containing approximately 1 percent polysulfide sulfur. On making up the dip with rain water there was a loss of approximately 8 percent in strength. During dipping the polysulfide concentration decreased, and generally the decrease became progressively greater as dipping proceeded. Some of this decrease is caused by the return to the dipping bath of the draining liquors, as it is in the draining pens that the dip is intimately exposed to the air.

Staphylococcus intoxication with two fatalities due to milk from a goat suffering from staphylococcus mastitis, L. A. Weed, A. C. Michael, and R. N. Harper (*Jour. Bact., 45 (1943), No. 4, p. 414*).

Swine brucellosis disease studied, G. C. Holm, W. B. Ardrey, and W. M. Beeson (*Idaho Sta. Bul. 251 (1943), p. 18*).—The findings in blood reaction studies of swine brucellosis in a breeding herd of 108 animals indicate that sows farrowing and nursing during the acute stages of brucellosis can transmit the infection to their offspring. Litters farrowed from reactor sows went through parturition and the suckling period without developing reaction titers. A negative boar was allowed to breed reactor sows, and a positive blood reaction developed in this boar within 2 mo. Three negative gilts were bred to each of two boars that were negative at the time of breeding but had reacted previously. None of the gilts developed positive reactions. One of the boars appeared to be sterile, although no clinical manifestations of swine brucellosis were observed.

Synergistic action of Hemophilus influenzae suis and the swine influenza virus on the chick embryo, II, F. B. Bang (*Jour. Expt. Med., 78 (1943), No. 1, pp. 9–16*).—In continuation of this study (E. S. R., 88, p. 824) blood cultures of embryos killed by the synergistic action of swine influenza virus and *H. influenzae suis* were found to be consistently negative, and embryos infected with swine influenza may be killed both by filtered extracts of frozen and dried *Hemophilus* and by suspensions of heat-killed bacteria. The addition of *Hemophilus* to the chorioallantoic membrane of embryos infected with swine influenza virus causes the virus to spread from the membrane to the allantoic fluid and embryo. This spreading effect also obtains when a purified preparation of hyaluronidase is used instead of *Hemophilus*, but it is unaccompanied by a comparable increase in mortality. It is probable that the spread of the virus produced by the bacteria is only partly responsible for the development of the complex infection, and that products of these organisms other than the spreading factor play a large part in the mortality of embryos receiving the combination of virus and bacterium.

Pyridoxine deficiency in swine, with particular reference to anemia, epileptiform convulsions, and fatty liver, M. M. WINTROBE, R. H. FOLLIS, JR., M. H. MILLER, H. J. STEIN, R. ALCAYAGA, S. HUMPHREYS, A. SUKSTA, and G. E. CARTWRIGHT. (Coop. U. S. D. A.). (*Bul. Johns Hopkins Hosp., 72 (1943), No. 1, pp. 1–25, illus. 12*).—It has been found that pyridoxine deficiency leads to the development of a severe anemia in pigs. "This is characterized by microcytosis, an increase of polychromatophilia, reticulocytes and nucleated red cells in the blood, a rise in the serum iron, bone marrow hyperplasia, and hemosiderosis in the spleen, liver, and bone marrow. Administration of pyridoxine is followed by a sharp reticulocyte response and rapid regeneration of blood with restoration of the normal size of the red corpuscles. Mobilization of iron from the tissues and its utilization in blood formation is indicated by the disappearance of hemosiderosis and a fall in the serum iron. The intensity of the response appears to be related to the amount of pyridoxine given and, probably, the route of administration. Pyridoxine deficiency leads also to the development of seizures in pigs which somewhat resemble the 'petit mal' and 'grand mal' of human epilepsy. These do not recur if adequate quantities of pyridoxine are given. Prolonged feeding of a diet deficient in pyridoxine is associated with the development of fatty infiltration of the liver. It is suggested that pyridoxine deficiency leads to the development of a metabolic disorder which, insofar as the anemia is concerned, is related to the utilization of iron. The nature of the mechanism by which pyridoxine deficiency arrests hemoglobin synthesis and elevates serum iron is not understood."

Response of pigs given large doses of Salmonella choleraesuis to sulfaguanidine, nicotinic acid, thiamin, and pyridoxine, G. K. DAVIS, E. B. HALE, and V. A. FREEMAN. (Mich. Expt. Sta.). (*Jour. Anim. Sci., 2 (1943), No. 2, pp. 138–145*).—In the investigation reported 36 pigs were administered a culture of *S. choleraesuis* and various combinations of supplements. Sulfaguanidine was an effective drug in protecting the pigs from the *S. choleraesuis*. Nicotinic acid did not prevent the pigs from reacting to the *Salmonella* but following an initial set-back was effective in promoting rapid recovery and increased weight gains. Vitamins B_1 and B_6 were not effective under the conditions of this experiment. The findings tend to substantiate previous observations that nicotinic acid is effective in preventing swine pellagra and in treating salmonellosis insofar as it enables the pig to maintain its body defenses, but that it does not act as a bacteriostatic or bactericidal agent.

Crystal violet vaccine against swine fever: A field trial, H. T. MATTHEWS and V. A. FREEMAN. (Mich. Expt. Sta.). (*Jour. Anim. Sci., 2 (1943), No. 2, pp. 129*).—Experimental work with hog cholera reported includes 17 case records. Of 36 vaccinated pigs severely exposed in 17 naturally occurring outbreaks of swine fever, 1 died of acute swine fever, 1 became ill but recovered, 3 showed reactions of a minor character, and 31 resisted infection. Crystal violet vaccine appears to have afforded a high degree of protection in this series of cases.

Tissue vaccine can control distemper, O. J. HUMMON and F. R. BUSHNELL (*Black Fox Mag., 27 (1943), No. 2, pp. 10–11, 25, illus. 4*).—The successful use of tissue vaccine procured from the lungs and livers of distemper-infected minks in the cure of minks affected with the disease is reported.

The occurrence of blood parasites in birds from southwestern United States, S. F. Wood and C. M. Herman (*Jour. Parasitol., 29 (1943), No. 3, pp. 187–196, illus. 18*).—In continuation of the preliminary survey made of blood parasites of birds in the Southwest, and reported by Wood and Wood (E. S. R., 77, p. 655), 1,525 birds of 112 species and subspecies were examined. Three hundred and fifty-seven individuals representing 54 species were infected. Trypanosomes were found in 42 birds of 22 species, including the following new host records: Anthony green heron, American pintail, western white-winged dove, California spotted owl, eastern flicker, western flycatcher, russet-backed thrush, yellow warbler, Macgillivray warbler, pileolated warbler, hooded oriole, Bullock oriole, Brewer blackbird, dwarf cowbird, western tanager, black-headed grosbeak, evening grosbeak, California purple finch, willow goldfinch, and Gambel sparrow.

Resistance of chickens to cecal coccidiosis, M. M. Farr. (U. S. D. A.). (*Poultry Sci., 22 (1943), No. 4, pp. 277–286*).—The administration of 1,000 sporulated oocysts of *Eimeria tenella* daily to chicks for 15 consecutive days resulted in the production of a high degree of resistance to cecal coccidiosis without any fatalities. A similar degree of resistance was produced when 15,000 oocysts were given in three doses of 1,000, 5,000, and 9,000 at intervals of 5 days. Birds which were resistant to infection with *E. tenella* and which had been held under conditions designed to preclude extraneous infection with infective oocysts for 6 mo. were tested and found to be still resistant to infection with this species of coccidia. Birds showing pronounced resistance to infections of cecal coccidiosis as a result of experimental inoculations retained their previously established resistance when exposed to a variety of chicken parasites, including *E. tenella,* for 2 mo. in outside pens. A severe case of coccidiosis resulting from a single heavy inoculation did not produce effective resistance to reinfection.

Food habits and intensity of coccidian infection in native valley quail in California, C. M. Herman, J. E. Chattin, and R. W. Saarni (U. S. D. A. et al.). (*Jour. Parasitol., 29 (1943), No. 3, pp. 206–208, illus. 1*).

Some observations on spleen volume in domestic fowls in the course of Plasmodium gallinaceum studies, P. F. Russell, Badri Nath Mohan, and P. Putnam (*Jour. Parasitol., 29 (1943), No. 3, pp. 208–216, illus. 1*).—This paper presents data on the spleen volume of normal fowls and the increased volume caused by chronic malaria, serum treatment, sporozoite vaccination, and chronic malaria following sporozoite vaccination with and without serum treatment.

The chick red cell agglutination test with the viruses of Newcastle disease and fowl plague, D. Lush (*Jour. Compar. Pathol. and Ther., 53 (1943), No. 2, pp. 157–160*).—The red cell agglutination test described by Hirst[2] was shown to be applicable to the viruses of Newcastle disease of fowls and of fowl plague. Serum-inhibition tests have shown that there is no serological relationship between the viruses. This test provides a useful method for the rapid laboratory diagnosis of either disease.

Studies on certain filtrable viruses.—[IV], Immunogenic properties of fowl pox virus prepared from the entire embryo, W. M. Thorning, R. Graham, and N. D. Levine. (Univ. Ill.) (*Poultry Sci., 22 (1943), No. 4, pp. 287–290*).—In continuation of the studies noted (E. S. R., 89, p. 119), preliminary work on the distribution of fowl pox virus in inoculated embryos indicated that the virus was present in the embryo proper and yolk as well as in the chorioallantois. "The greatest concentration of virus was noted in the chorioallantois, a lower concentration in the yolk, and a still lower concentration in the embryo proper. In the chorioallantois virus was generally demonstrated in a dilution of 1:640 (the highest employed), while in the yolk and embryo proper virus was demonstrated in dilutions ranging from 1:10 to 1:160. There was a high correlation between the appearance of takes following the application of yolk, chorioallantois, and embryo proper virus and protection against subsequent artificial exposure to fowl pox. No detectable difference was noted between the concentration of virus in different portions of the embryo diluted (1:10) with 50 percent buffered glycerine containing 0.5 percent phenol and those held undiluted over a period of 14 days at a temperature of —4° C. The entire developing chick embryo inoculated with fowl pox virus was employed successfully to immunize chickens against pox. Of 58 chickens inoculated with entire embryo virus containing chorioallantois, yolk, albumin, embryo proper, and fluid, 89.76 percent were protected against subsequent artificial exposure to the virus. A definite correlation was observed between takes induced by entire embryo virus and resistance to subsequent artificial exposure to fowl pox."

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[2] Science, 94 (1941), No. 2427, pp. 22–23; Jour. Expt. Med., 75 (1942), No. 1, pp. 49–64, illus. 1.

The influence of age of host and temperature of incubation on infection of the chick embryo with vesicular stomatitis virus, B. SIGURDSSON (*Jour. Expt. Med., 78 (1943), No. 1, pp. 17–26, illus. 4*).—It was found that after 7 days' incubation chick embryos are much more susceptible to infection with vesicular stomatitis virus than are 10-day embryos. A 100-percent mortality resulted, and they were suitable for titrations of the virus The rate of increase of virus in 7- and 10-day embryos was studied. Two different temperatures of incubation were employed, 35°–36° and 39°–40° C., and the growth curves for the virus under the different conditions are presented. Ten-day embryos were highly resistant, and at 39°–40° more than half of them survived. At the lower temperature of incubation, 35°–36°, all 10-day embryos died, but they survived much longer than did 7-day embryos. In the 7-day embryo death occurred after about 12 hr. at 39°–40° and after about 16 hr. at 35°–36°, or earlier at the higher temperature. In embryos of both ages the virus titer reached at the high temperature was only about 1 percent of that reached at 35°–36°, even in those that died.

Further studies of the "3T" strain of Plasmodium cathemerium in white Pekin ducks, F. WOLFSON (*Amer. Jour. Hyg., 37 (1943), No. 3, pp. 325–335, illus. 2*).—A report of work (E. S. R., 80, p. 401) in which the 3T strain of *P. cathemerium*, which had been inoculated from a canary into ducks, was subsequently passed by means of intravenous blood inoculation through a total of more than 115 ducks. The semiweekly transfer of infection was carried out over a period of about 5 mo. Figures are presented in this paper to illustrate periodicity in segmentation, and other figures and tables to indicate the degree of parasitemia and anemia produced by the 3T strain in the duck.

Diseases of turkeys, W. R. HINSHAW (*California Sta. Bul. 613, rev. (1943), pp. 135, illus. 60*).—A revision and enlargement of this bulletin (E. S. R., 78, p. 857).

A case of turkey lymphomatosis, E. E. HARNDEN and H. C. SMITH. (Okla. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 4, pp. 331–333, illus. 1*) —A review of the literature is followed by the report of a case of lymphomatosis observed in a flock of some 5,000 birds of all breeds at the Oklahoma Agricultural and Mechanical College. This turkey, which had laid eggs for hatching purposes in the early spring, was noticeably ill 3 or 4 weeks before death, at which time it weighed about 10 lb.

Experiments with sulfanilamide for turkeys, W. R. HINSHAW and E. McNEIL. (Univ. Calif.). (*Poultry Sci., 22 (1943), No. 4, pp. 291–294*).—Report is made of experiments conducted with a view to recording the tolerance of turkeys for sulfanilamide and to emphasize its limitation for this bird. Observations on its effect on egg production in chickens as well as in turkeys are included. It was found toxic for 4-week-old Bronze turkeys when given in a single dose of 3.0 gr. per pound of weight and for 4-month-old turkeys when given in four daily doses of 1.0 gr. per pound. "Four daily doses of 0.6 to 0.75 gr. per pound caused slight loss in weight, cyanosis, and marked uremia, but no deaths in 4.5-month-old turkeys. Mature Bronze female turkeys tolerated 0.5 gr. per pound of weight daily for 3 days, but even a single daily dose of this amount caused premature expulsion of both hard- and soft-shelled eggs and marked drop in production lasting for 1 week. Adult White Leghorn females given single doses of 1.5 to 2.5 gr. per pound of weight showed the same effects. No visible ill effects could be noticed in adult Bronze males given 0.6 gr. per pound of weight on 2 successive days. Examination of hatchery records failed to reveal any effect of the drug on fertility or hatchability as a result of treating these birds. Sulfanilamide in doses given had no curative effect in birds suffering from infectious sinusitis."

Hexamita sp. from the ringed-neck pheasant transmissible to turkeys, D. E. Stover (*Jour. Amer. Vet. Med. Assoc., 103 (1943), No. 796, p. 37*).—Report is made of a spontaneous outbreak of hexamitiasis in ringed-neck pheasants and the successful transmission of the organism (*Hexamita* sp.) to turkey poults.

AGRICULTURAL ENGINEERING

Farm tractors: Their care, operation, and maintenance, M. M. Jones and L. E. Hightower (*Missouri Sta. Bul. 468 (1943), pp. 40, illus. 32*).—The authors caution that many operators are not sufficiently skillful in mechanical operations to attempt major repair work, but consider that every operator, even though he may not be able to do major repairing, can learn to take care of his tractor so as to insure satisfactory, trouble-free service over long periods. Directions for such adjustments cover the air cleaner, adjusting the carburetor, tractor fuels, engine warm-up, engine lubrication, care and lubrication of the transmission, front wheel bearings, valve adjustment and maintenance, adjusting engine bearings, the cooling system, the ignition and electrical system, care and adjustment of the magneto, the clutch, rubber tires, hitch adjustments, and preparing a tractor for storage. Tractor operating efficiency and costs are also discussed.

An inexpensive sugar beet loader, E. C. Sauve and F. Linebaugh (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 333–336, illus. 2*).—The authors here give a brief general description of a machine, for the construction of which plans and specifications were made available by the agricultural engineering department, Michigan State College. The cost of construction is estimated at about $60; its capacity sufficient to permit loading 5 net tons of beets into a truck in 25 min., three men loading. The power requirement is less than 1 hp., a small, lightweight, high-speed engine being used when the loader is to be dragged from pile to pile by an arm attached to the front bumper of the truck. A tractor may be used as a stand-by unit, the loader then being driven from the power take-off. The loader is made largely of wood. The major steel parts are the pulleys, chain links, sprockets, and shafting. Carriage bolts, machine bolts, lag screws, and wood screws were used to fabricate the unit, and the construction represents a minimum use of critical materials.

An elevator for ear corn, W. H. Sheldon and D. E. Wiant (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 291–297, illus. 5*).—The elevator described has a trough 12 in. wide inside; is 16 ft. long; carries twenty-five 3⅝- by 11-in. slats on 27 ft. of No. 45 steel, detachable link-chain belting; and is designed to have a belt speed of about 120 ft. per minute. The machine is satisfactorily driven by 0.5-hp. motor. It was found that an elevator built according to the design and specifications presented has ample capacity to care for ear corn faster than a two-row picker can pick it. It can elevate corn faster than three men can shovel, and it has sufficient capacity to handle corn as dumped from a wagon. It will also elevate small grain at a rate of 1,000 bu. per hour, when inclined at an angle of 45°. The article contains full directions for the construction of the machine, illustrated by photographs and by drawings of some details, an order list for lumber, and a bill of materials.

Vapor barriers in relation to moisture accumulation in walls of farm storages, R. E. Marshall (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 376–381, illus. 2*).—The relation of vapor pressure of atmospheric moisture to temperature and relative humidity is outlined, together with the expected behavior of walls of storages with respect to condensation and evaporation of the accumulated moisture under various temperature gradient conditions encountered in practice in Michigan. A diagrammatic representation of a double-tile wall, with fill insulation, shows temperature gradients for each month of the year, with the point in the insulation where the dew point may be expected to be reached in each month. Water-vapor permeabilities of various building materials and the vapor-barrier coatings are graphically shown.

In the sharp freezer or locker plant two coats of aluminum or asphalt paints should be applied to the outside tile unit of the wall. For the storage operated throughout the year at 32° F., it is recommended that a like vapor barrier be added to the outside tile wall. For the types of storages operated at 32° from late August through March or April, and by air cooling from late September through March, well-laid face tile is considered to be, in itself, an adequate vapor barrier, and no additional vapor-resistant coating is recommended.

AGRICULTURAL ECONOMICS

Some investigations on the suitability of the township as a unit for sampling Iowa agriculture, N. V. Strand and R. J. Jessen. (Coop. U. S. D. A. et al.). (*Iowa Sta. Res. Bul. 315 (1943), pp. 613–650, illus. 2*).—This is an empirical study based on data for 1927–37 obtained from the records of township assessors supplemented by data collected in the field in eight counties and the central crop-reporting district of the State. The items investigated included farm, oat, corn, hay, and pasture acreages, corn and oat production, and number of sows bred for spring farrow. Eighteen methods of selecting the townships were tested. Usually two kinds of township selections were tried with each method. A briefer study was also made of the township as a sampling unit for the crop-reporting district.

Regarding the items investigated none of the 18 methods was outstandingly accurate. "Relatively large samples were required to give suitable accuracy for county estimates. If no greater than 5 percent errors are tolerable, then it appears that samples taken in the manner considered herein must be greater than half the county population, for those items being investigated." In general the same conclusions were arrived at in the crop-reporting district study, but a relatively smaller sample was adequate. Matched individual farms did not provide estimates noticeably more accurate than random individual farms selected for each year. "With the two counties investigated it was found that geographic stratification was most effective and that the section was the most efficient. Stratification by four proposed soil groupings did not prove to be as efficient as either township or section. Tenure was the least efficient of the stratification procedures tested."

Taxable property per child in farm and non-farm communities of Iowa, W. H. Lancelot (*Iowa Sta. Bul. P55 (1943), pp. 781–800*).—Three comparisons of the taxable property in 1941 per person of school age in the two types of communities were made as follows: (1) Twenty open country consolidated school districts with 20 independent town school districts, (2) 60 township districts (15 in each quarter of the State) with 60 similarly distributed independent town districts with less than 1,000 population and 60 such districts with over 1,000 population, and (3) all township and rural independent districts in 15 widely distributed counties with all independent town districts in the same counties.

The first study showed the amount of taxable property per person of school age to be $7,732 in the consolidated districts and $2,434 in the town districts. In the second study, the amounts were $7,735 in the farm townships and $2,327 in the villages and towns of less than 1,000 population and $2,116 in the urban communities of over 1,000 population. In the third study, the average taxable property per child was found to be $6,696 in the rural and $2,146 in the town districts.

Man power requirements and the outlook for available labor, crop year 1943: Arizona's irrigated farms, E. D. Tetreau (*Arizona Sta. Mimeog. Rpt. 52 (1943), pp. 7+*).—A study of farm labor requirements in five counties of Arizona showed that the hired labor requirements might vary from 20,000 to 51,000 men during the season of 1943, in addition to some 7,600 year-round men on farms.

An economic study of farm labor in Indiana, B. R. Bookhout (*Indiana Sta. Bul. 478 (1942), pp. 38, illus. 8*).—Data were gathered by the survey method for 214 White County (a typical rural county) and 227 Madison County (an agricultural area influenced by industrial cities) farms. Tables and charts are included and discussed showing typical monthly labor requirements for different livestock enterprises and major crops in central Indiana, the average total labor force and requirements, and the relation between man work units per man and value of crops and farm receipts per tillable acre, crop yield index, and livestock efficiency index. The variations in the use of labor with size and type of farm, amount of family labor, tenure status, land use area, distance from market, type of power used, equipment owned, and the amount of off-the-farm work are analyzed. The progress in mechanization is described, and typical organizations for farms of three sizes are discussed.

Farm labor requirements in Maryland, S. H. DeVault, A. B. Hamilton, and P. R. Poffenberger (*Maryland Sta. Misc. Pub. 15 (1943), pp. 9+, illus. 1*).—A survey of farm labor requirements in the State estimated that about 83,000 men would be required to produce and harvest farm crops and care for livestock at the peak 1943 season. Seasonal labor requirements amount to about 13,000 workers, of whom 4,800 would be migratory laborers from outside the State. In 1942 84 1 percent of the farmers had an inadequate labor supply, and on 265 representative farms about one person to every two employed was lost during the year. A suggested farm labor program for 1943 is appended.

Farm manpower situation in North Carolina, 1943, G. W. Forster, C. H. Hamilton, R. E. L. Greene, and S. C. Mayo (*North Carolina Sta. Bul. 340 (1943), pp 29+, illus. 10*).—This study is based on a State-wide, farm-to-farm census made in January and February 1943. It shows the farmers' production in 1942 and the planned production in 1943, the 1943 needs for equipment and supplies, and the labor available on each farm in 1942 and the supply expected to be available in 1943. Using a county representative of each of the 12 major type-of-farming areas the data were analyzed, and tables and charts are included showing for the Tidewater, Coastal Plain, Piedmont, and Mountain sections in war units ("a measure of production of essential farm products, based on the amount of labor required to produce an acre of essential crops or care for a given number of units of livestock") the amount and percentages of labor shortages; farm manpower available; current farm employment by types—operators, sharecroppers, and hired labor; the distribution of 5,513 farm workers by age and sex; and males of draft age on farms. The major factors in the labor situation are discussed, and lines of action on farm, neighborhood and community, county and regional, and State and national levels are outlined.

Farm labor survey, A. D. Edwards and J. H. Stevenson (*South Carolina Sta. Rpt. 1942, pp. 12–13*).—Farm labor survey in South Carolina showed that while there was a decrease in the amount of labor on farms during the 1942 work season, it did not appreciably affect agricultural production. However, "farmers were greatly concerned about the possibilities of labor shortages for 1943"

Problems of beginning farmers in Iowa, J. A. Starrak (*Iowa Sta. Res. Bul. 313 (1943), pp. 513–579*).—This study, made to determine the major problems of young farmers and the ways and means commonly employed by the beginning farmers in solving such problems, and to ascertain the degree of success achieved by young farmers and the nature and extent of formal education and experience of typical beginners, is based on interviews with 504 farmers who had begun farming as independent operators since 1930. The discussion is organized under the headings financing, obtaining land and livestock, production of crops and livestock, equipment, number and condition of buildings, and educational and farming experience of operators.

Information for prospective settlers in Alaska (*Alaska Sta. Cir. 1, rev. (1941), pp. 34+, illus. 18*).—This is a revision (E S. R., 77, p 264) along the same lines.

Farm size and its relation to volume of production, operating costs, and net returns—southeastern Nebraska, 1930–1939, W. L. Ruden (*Nebraska Sta. Bul. 346 (1943), pp. 16, illus. 9*).—This study shows, among other things, that (1) on farms valued at $40 per acre labor incomes varied directly with size of farm, while on similar land valued at $100 per acre only the smallest farms had a positive labor income; (2) of the efficiency factors, efficiency of feeding livestock had the greatest influence, rate of crop production was second, and number of crop acres least important; (3) on family farms of a specified size it cost more per acre to operate with horses and tractors than with horses alone; and (4) crop acres tilled per man increased directly with size of farm.

Information basic to farm adjustments in the Rolling Plains Area of Texas, P. H. Czarowitz and C. A. Bonnen (*Texas Sta. Bul. 617 (1942), pp. 108, illus. 8*).—"This bulletin reports results of a detailed study of the organization and operation of 200 representative farms in the Rolling Plains Area of Texas. The purpose of the study was to provide basic information which might be used in appraising alternative adjustments in the different sizes of farms and systems of farming found in the area. The data obtained include detailed information pertaining to soils, soil erosion, conservation needs and practices, farm organization, farm income and production, production requirements, and production practices for each enterprise. Insofar as possible all these data were related to the major differences in soil types."

The agricultural history, physical resources, and present agriculture of the area are described. Analysis is made of the farm earnings in 1935, the production and production requirements of different crops and kinds of livestock, products used on the farm, farm power, overhead farm expenses, and prices of products sold and purchased. Possible adjustments in the farm organizations and practices are discussed.

The following conclusions are reached as to alternative systems of farming: "(1) Increasing the size of farm to utilize more fully operating capital and management, after adjustments required by the AAA program, compares favorably with other alternatives from an income standpoint and more especially so on row crop farms using horse-drawn equipment. . . . (2) Where additional land cannot be obtained, a system of farming involving more than the usual amount of livestock production is indicated. . . . (3) Generally speaking, farm income increased with size of farm. The advantage of larger size tends to increase during periods of relatively high prices and is greatly reduced during periods of relatively low prices." The differences of estimated income between row crop farms using one set of two-row horse, two-row tractor, and four-row tractor-drawn machinery for the periods 1927–29 (high prices) and 1931–33 (low prices) were $1,800, $2,500, and $4,500, respectively. "(4) It was estimated that contouring or terracing on the heavy dark land would increase earnings on row crop farms using one set of two-row tractor-drawn equipment by approximately $200 per year, assuming average prices of the period 1927–35."

Consolidation of irrigation companies aids water conservation, O. W. ISRAELSEN (*Farm and Home Sci.* [*Utah Sta.*], *4* (*1943*), *No. 2, pp. 5, 10–11, illus. 1*).—This article, while written primarily for Utah, is applicable to irrigation companies elsewhere. It discusses the advantages of consolidation, the companies that may be consolidated, and the obstacles in the way of consolidation.

Farmers' cooperative discontinuances, 1875–1939, W. W. COCHRANE and R. H. ELSWORTH (*U. S. Dept. Agr., Farm Credit Admin., Misc. Rpt. 65* (*1943*), *pp. 38+, illus. 5*).—Data are presented and discussed as to the distribution; types; years of organization and discontinuance; characteristics and practices; losses of capital, on products, and by creditors; and the reasons and causes for discontinuances. Only associations marketing farm products and purchasing farm supplies that were discontinued prior to the end of 1939 were included.

Dollars and sense in farming, K. T. WRIGHT (*Michigan Sta. Spec. Bul. 324* (*1943*), *pp. 44, illus. 11*).—This study is based chiefly on 1,525 farm accounting records for 1933–38 for the dairy and general farming regions in the central part of the Lower Peninsula. Tables and charts are presented and discussed showing how farm earnings are affected by prices of products; soils; size of business; the crop and livestock programs; efficiency of operation; and other factors—specialization v. diversification, type of farming, ownership, changes in prices of products, etc.

The war and Michigan farm prices and costs, O. ULREY (*Michigan Sta. Quart. Bul., 25* (*1943*), *No. 4, pp. 304–313, illus. 4*).—Tables and charts present data covering periods of considerable length as to indexes of prices of Michigan farm products, farm food prices, retail food prices, distribution costs, Michigan farm wages, taxes and interest payments, indexes of farm costs, etc.

Production costs for corn and grass silage, C. R. CREEK (*Massachusetts Sta., 1943, FM–12, pp. 9+, illus. 1*).—An analysis is made of the costs per ton in 1942 of corn and of several grass silages, based on data obtained for corn silage on 18 farms (5 also produced grass silage) and 9 farms that had grass silage. The total average cost per ton for corn silage was $6.51, being $6.26 on the largest and $7.62 on the smallest farms. The average costs for grass silages were clover and alfalfa $5.54, clover and grass $7.20, native grasses $4.77, and oats $7.29.

Cost of producing cotton in southeast Missouri, 1941, B. H. FRAME (*Missouri Sta. Bul. 467* (*1943*), *pp. 27*).—Records covering 2,478.7 acres of cotton in the western part of New Madrid County were obtained from 34 owner operators, 38 tenant operators, and 16 sharecroppers. Analyses were made by type of operator of the costs per acre and per pound of lint cotton, of production—man labor, horse and tractor work, equipment, and fertilizer and seed—harvesting, and ginning.

The average net costs (gross cost less value of seed) per acre and per pound of lint cotton, respectively, were owner operators $28.13 and 5.96 ct., tenant operators $28.16 and 5.43 ct., sharecroppers $26.89 and 4.7 ct., and average $27.98 and 5 53 ct. Labor, exclusive of cost of hauling to the gin, constituted 57.9 percent of the gross cost. The value of seed was equal to 37.5 percent of the gross cost. Cost per pound of lint cotton decreased from 8 22 ct. with yields of 250 to 324 9 lb. per acre to 5.77 ct. with 475 to 549.9 lb, and to an average of 4.17 ct. for three growers having yields of 786, 934, and 1,000 lb. per acre, respectively.

[Cost of producing vegetable seeds in southern Idaho] (*Idaho Sta. Bul. 251 (1943), p. 32*).—A table by N. Nybroten and L. J. Fenske shows the labor costs and total costs, exclusive of management, of producing carrots, hybrid sweet corn, onions, head lettuce, and baby lima beans in 1941.

Costs of distributing milk in New Jersey, L. Spencer (*Trenton: N. J. Dept. Agr., 1943, pp. 45+*).—This is a brief summary of the findings in a study authorized by the New Jersey Legislature. It deals chiefly with the sales, expenses, and profits of milk dealers and costs of handling, processing, and delivering a quart of milk. Brief sections deal with the cost of distribution by subdealers and retail food stores.

Cost of operating farm machinery in eastern Canada, W. Kalbfleisch (*Canada Dept. Agr. Pub. 750 (1943), pp. 22*).—Tables, based on reports of the Dominion Experimental Farms Service and information in the literature, are included and their use explained showing the estimated cost per acre, day, year, etc., for different kinds of machines and tractors, and the cost of different farm operations. Other tables show the methods of calculating machinery, tractor, and horse work costs.

[Rates of work for tractor operations]. (Coop. U. S. D. A.). (*Idaho Sta. Bul. 251 (1943), p. 31*).—A table by P. A. Eke shows a drawbar horsepower rating, calculated and reported acres per day, drawbar horsepower hours per acre, acres per 10-hr. day, and the acreage covered during the season by tractors used for different operations on irrigated farms.

Income from field beans, L. H. Brown (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 298–302*).—This study is based on the records of 177 bean growers for 1937–41. The average gross income was $27 per acre, or $1.58 per bushel. Yield, time of marketing, quality, and variety grown were the most important factors affecting gross income.

Income from potatoes, L. H. Brown (*Michigan Sta. Quart. Bul., 25 (1943), No. 4, pp. 282–287*).—Using data from records of selected farmers for 1937–41, the average gross income, 1937–41, was determined as $53 per acre or 33 ct. per bushel. Yield was the factor chiefly affecting income. The average yield and gross income for certified seed potatoes were 263 bu. per acre and $146 per acre.

The production and marketing of potatoes in Rhode Island, J. L. Tennant and A. Joss (*Rhode Island Sta. Bul. 287 (1942), pp. 47, illus. 16*).—This bulletin analyzes and discusses the production in Rhode Island and neighboring States—trends, varieties, and practices; the Providence wholesale market—volume of potatoes handled, distribution, etc.; the prices of local and Maine potatoes; and the opportunities for expanding the production in Rhode Island.

Potato production in Rhode Island increased from 237,000 bu. in 1929 to 920,000 bu. in 1941. Of the potatoes marketed in the Providence wholesale market, about 8 percent were from Rhode Island, Connecticut, and Massachusetts and 65 percent from Maine in 1929, as compared with 40 and 32 percent, respectively, in 1940. Prices of Maine potatoes in the Providence market were above those of local potatoes in 5 of the 35 mo. when both were sold during the crop seasons 1930–31 through 1934–35 and during 23 of the 42 mo. 1935–36 through 1940–41. The present potato acreage in the State is between 4,000 and 5,000. Some 54,500 acres now in woods and feed or cash crops are on soil types adapted to potatoes. With an average acreage somewhere between the present acreage and 15,000 acres it will probably be necessary to ship potatoes out of the State.

Indiana milk supply for different market outlets, V. C. Manhart *(Indiana Sta. Bul. 479 (1943), pp. 22, illus. 8)*.—Data as of March 1, 1940, as to milk outlets and factors influencing the milk supply were obtained from questionnaires returned for 5,088 farms in 79 counties and 2,362 additional farms in the 92 counties of the State Data relative to the quality of milk and cream were obtained by survey and bacteriological analyses at dairy plants. Data were also compiled from reports of the U. S. Bureau of the Census and the U. S. Department of Agriculture. The number of cows milked and the milk produced by crop-reporting districts, the regional influences on dairying, the size of herds and associated factors, and milk outlets patronized by farmers are discussed.

Nearly 83 percent of all farms kept cows for milk production in 1940 An estimated 34 percent kept only 1 or 2 cows, and 17 percent utilized all the milk on the farm. Approximately 72 percent of the farm dairy herds consisted of 1 to 5 cows, 22 percent of 6 to 10 cows, and only 6 percent of over 10 cows. Farmers with small herds tended to market a lower quality of product. Farms selling churning cream predominated in all but 3 of the 9 crop-reporting districts. Of the milk cows for the State, 53 4 percent were on farms reporting sales of whole milk as compared with 41 4 percent reporting sales of cream.

World wheat survey and outlook, May 1943, H. C. Farnsworth, V. P Timoshenko, and M. A. Clough *(Wheat Studies, Food Res. Inst. [Stanford Univ.], 19 (1943), No 6, pp. 203–232+, illus. 4)*.—Mounting evidence of heavy wheat utilization in North America was a major feature of the first 4 mo. of 1943. In the United States, domestic disposition will reach at least a billion bushels in the crop year. For feed and alcohol alone, the use of wheat in this country will considerably exceed the world's net exports of wheat and flour in 1942–43. In the four chief exporting countries combined, wheat utilization will be over 300 million bu. larger than the previous maximum in 1930–31. Yet the United States carry-over will be the second largest on record, and August 1 stocks will be larger than ever before in Canada, Australia, and Argentina. In Axis Europe the bread-grain position of 1942–43 was the worst since 1917–18, but except in the Danube Basin bread rations were not generally reduced Supplies were stretched by further increases in flour extraction rates and in percentages of admixtures of nonwheat flours. The current shortages of bread in Axis Europe, the Middle East, and French North Africa seem likely to be partially relieved by better crops in 1943.

Marketing livestock in the Corn Belt region. (Coop. 13 expt. stas. and U. S. D. A.). *(South Dakota Sta. Bul. 365 (1942), pp. 198+, illus. 31)*.—This is the regional report, prepared by K. Bjorka (U. S D. A.) collaborating with State representatives and the technical committee and chairman of the Corn Belt Livestock Marketing Research Committee, of a study made by the State agricultural experiment stations of the 12 Corn Belt States and Kentucky and Oklahoma and the U. S. Department of Agriculture. Reports on the individual States have been or are to be published by the respective stations. The data presented are largely regional averages for 1940, with some comparisons between States. No attempt is made to analyze the effectiveness of the various marketing methods and practices. The report analyzes and discusses the importance of the livestock industry in the region, the markets and their marketing agencies, markets used by farmers in buying and selling, different kinds and classes of livestock, the sources and disposition of livestock handled by the different types of markets, size of lots bought and sold, transportation, weights and classes of livestock bought and sold by farmers, trading by weight and by head, operations at and services employed by different types of markets, the determination of prices, and classes and grades and market news. Appendixes describe the methodology in the study; the classes, weights, and grades used by packers buying direct or at concentration yards; and tables summarizing the data by States.

Marketing Michigan honey, G. N. Motts (*Michigan Sta. Spec. Bul. 321 (1943) pp. 50, illus. 13*).—The data were obtained through interviews and correspondence with 179 honey producers who sent two sales reports per month for the period February 1939–August 1940, questionnaires regarding sales outlets and marketing methods, and interviews with 16 money dealers and bottlers and 8 wholesale grocers and chain store companies. The honey production of the State and its quality; the preparation for market; interstate movements: the sales channels and middlemen; sales units; sales promotion method of producers, wholesalers, retailers, and chain stores; marketing costs and margins; and cooperative marketing are described. The appendix includes the State rules and regulations governing the sale of honey and the grades of extracted, comb-section, and wrapped cut-comb honey.

Maximum prices of agricultural commodities and their products, M. F. Cannon (*U. S. Dept. Agr., Bur. Agr. Econ., 1943, pp.* [*197*]).—This report shows, "in chronological order, the maximum price regulations that have been issued by the Office of Price Administration on each agricultural commodity and its products all along the line from the farmer to the consumer. The purpose is to give an over-all picture showing at what level the products are controlled and briefly what the type of regulation is. The notations are necessarily abbreviated and incomplete. In general, they do not include exceptions, differentials, regulations for individual cities, prices for new container types and sizes, etc. Domestic products only are included."

Corn futures statistics, January 1940–September 1942 (*U. S. Dept. Agr., Food Distrib. Admin. 1943, CS–1, pp. 35+*).—A continuation of the statistics previously noted (E. S. R., 88, p. 123).

Annual report on tobacco statistics, 1942 (*U. S. Dept. Agr., Agr. Market. Admin., 1942, pp. 102+, illus. 1*).—This is the seventh of the series previously noted (E. S. R., 89, p. 390).

RURAL SOCIOLOGY

The restandardization of a sociometric scale, W. H. Sewell. (Okla. Expt. Sta.). (*Social Forces, 21 (1943), No. 3, pp. 302–311*).—This is a refinement in method.

A guide to agricultural programs in south central Indiana (type-of-farming area 8), L. S. Robertson et al. (*Indiana Sta. Bul. 480 (1942), pp. 48, illus. 18*).—This report was prepared by the agricultural staff of Purdue University for "agricultural workers, public officials, and others interested in the formulation and development of policies and programs designed to improve the welfare of rural people in the unglaciated portion of south-central Indiana." It "emphasizes economic and physical problems—such as farm income, soil and timber conservation and land utilization—on the assumption that in the long run the welfare of the people is associated closely with their economic status. Some consideration has been given to education, population adjustment, and local government." The four sections deal with the location and principal problems of the area, the action needed in solving the problems, the forest and agricultural practices, and the research needed in the area.

Land utilization in New Hampshire.—II, Summer homes and the rural economy, J. C. Blum. (Coop. U. S. D. A.). (*New Hampshire Sta. Bul. 344 (1942), pp. 54, illus. 12*).—This second study (E. S. R., 78, p. 126) was undertaken to determine the forces underlying the summer home development and to indicate the nature of the social relationships and problems resulting. The data were obtained from public records and interviews with 291 summer and 440 year-round residents of the towns of Francestown, Sanbornton, and Tuftonboro. The history and physical features of the towns are described. The forces underlying the recreational development, occupation, residence, family characteristics of the summer residents, the effects of the development on land use and occupancy, crop and livestock production, farming and conservation, improvement of the properties, employment of labor, household income, taxes, expenditures for roads and schools, etc., are discussed.

An economic and social survey of Botetourt County, I. B. Cohen, R. N. Gilliam, W. H. Hodill, R. H. Kirkwood, and W. P. McDonald, Jr. (*Charlottesville: Va. Univ., 1942, pp. 170, illus. 5*).—Included are discussions of the history, resources, people, agriculture, commerce and industry, wealth and taxation, government and public debt, schools and education, health and public welfare, and the standard of living in the county.

The impact of war on some communities in the southwest, E. D. Tetreau. (Univ. Ariz.). (*Amer. Sociol. Rev., 8 (1943), No. 3, pp. 249–255*).—The impact of war on communities differs with their size. Smaller communities are most severely depleted of able-bodied men, of doctors, nurses, and business services. Larger communities gain in members, high wages, excitement, fanfare of drives, church support, and civilian defense organization. High schools in larger communities suffer the greatest losses in pupils, but all schools in small communities are depleted of their ablest teachers. Esprit de corps is high in larger communities, but the will to win the war is most intense in remote and small communities.

The rural health facilities of Lewis County, Missouri, R. B. Almack (*Missouri Sta. Res. Bul. 365 (1943), pp. 42, illus. 3*).—This report deals with health agencies and the extent of their use in the county, covering the experience of 317 open-country households for the year ended July 31, 1939. The total expenditures for all medical and health services used by these households was $13,091. Approximately one-fourth of the 240 households reporting illness made no use of available medical facilities.

FOODS—HUMAN NUTRITION

Meeting the nutrition problem with a vegetable garden, A. Biester. (Univ. Minn.). (*Minn. Hort., 71 (1943), No. 4, p. 52, illus. 1*).—Vegetables recommended for the garden include potatoes and root crops, since they store well and do not, therefore, require time and energy for canning; legumes because of the protein they furnish; tomatoes, cabbage, and salad greens because of their vitamin C; and green and yellow vegetables for their vitamin A.

Some methods of fruit preservation in wartime, J. E. Richardson and H. L. Mayfield (*Montana Sta. Cir. 173 (1943), pp. 8*).—This circular, emphasizing the importance of the home preservation of fruits, points out that they may be canned either in a sirup or in water, placed in freezing storage, or dehydrated. Some information about the details of these methods as suited to the various fruits is presented.

Dehydration isn't very different, E. H. Wiegand. (Oreg. Expt. Sta.). (*Canner, 96 (1943), No. 13, pp. 12–13, illus. 2*).—In face of the tremendously increased demand for dehydrated foods for the armed forces, it is estimated that at least 200 dehydration plants in addition to the 120 now completed will be required to meet these production needs. A brief description of the process of dehydration is presented in order to indicate to the canner, in particular, that this process is not very different from the usual processes practiced in commercial canning, and that altering the procedure from canning to dehydrating is, therefore, possible with minimum effort.

Small dehydrators for vegetables, I, II, S. G. Davis, W. B. Esselen, Jr., and F. P. Griffiths. (Mass. Expt. Sta.). (*Food Indus., 15 (1943), Nos. 5, pp. 54–57, illus. 4; 6, pp. 53–55, 108–109, illus. 3*).—The functions of heat, humidity, and air flow in the operation of a dehydrator are summarized briefly to indicate the basic principles that must be borne in mind in the construction of any dehydrator. Part 1 offers construction details for two types of small home dehydrators of simple design and adapted for operation over one gas or electric stove unit. Part 2 gives construction details for a slightly larger dehydrator suited to pilot control work or to the dehydration of quantities sufficient for several families. General directions are given for preparing the vegetables for dehydration and for operating the dehydrator. Estimates of the cost of operation are also given.

Experiments with dehydrated powdered vegetables, L. A. Hohl and V. A. Haas. (Univ. Calif.). (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1943), No. 10, pp. 305–308, 317*).—Carrots, spinach, asparagus, and peas were experimentally dehydrated and powdered in a number of ways, and the reconstituted products, resulting in purées, were judged for quality. The best carrot purée was obtained from carrots blanched and dehydrated at 140° F. until bone dry (less than 5 percent moisture) and then powdered in a hammer mill. Spinach, asparagus, and peas were best when blanched, made into a purée, and drum dried. The carrots and spinach were subject to oxidative deterioration and had to be packed in vacuum containers or in an inert gas. A variety of precooking treatments was applied to these vegetables, which were then dehydrated in a forced draft tunnel dryer at 140°–150° until completely dry, and then powdered. A short blanch in flowing steam was found to be the most suitable from the standpoint of keeping quality and of flavor and texture of the reconstituted product. The optimum length of blanch varied for the several vegetables. The blanched or precooked vegetables required no further cooking of the dehydrated product. Color and reconstruction ratios were best in the unblanched samples, but these developed a hay flavor and other undesirable changes upon storage and required cooking after rehydration.

Sulfured dehydrated vegetables, G. Mackinney, H. F. Friar, and E. Balog. (Univ. Calif.). (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1943), No. 10, pp. 294, 315*).—The tests described were concerned with sulfuring of dehydrated vegetables as a means of preventing the development of off-flavors and odors upon storage at 90° F. for a few months. Satisfactory levels of SO_2 were attained in the dehydrated products (asparagus, cauliflower, broccoli, cabbage, and carrots) by subjecting the vegetables after the regular blanching to brief dips, not over 15 sec. in duration, in sodium bisulfite or potassium metabisulfite solutions of 0.25 or 0.50 percent concentration. In carrots and cabbage SO_2 at 1,920 or 3,260 p. p. m., respectively, was definitely noticeable to the taste, although not considered objectionable, while at lower concentrations, 960 and 1,520 p. p. m., respectively, the SO_2 was scarcely noticeable. The results indicated that the development of hay flavors in cabbage and carrots was definitely held in check at 90° if the product was sulfured, even though stored in air in sealed containers. Retention of ascorbic acid and carotene was definitely greater in the sulfured than in the nonsulfured vegetables.

Packaging requirements for dehydrated vegetables, A. L. PITMAN, W. RABAK, and H. YEE. (U. S. D. A.). (*Food Indus., 15 (1943), No. 1, pp. 49–52, 104, illus. 2*).—Requirements of a packaging material are that it should be impervious to moisture-vapor, O_2, CO_2, and N_2. Other requirements of the package are that it offer sufficient strength to resist puncture or bursting during shipment and be of such shape that it can be packed with little waste of space, have a heat-closing or other readily closed lining, be low in cost, and finally, be constructed of materials not low in supply. Experimental measurements under controlled conditions of moisture-vapor resistance and permeability of various materials and measurements of the permeability of seals or seams led to the specifications suggested for packages in military use and to the following conclusions:

Double bags of supercalendered wax sulfite paper approach the vapor resistance of the better glassines. Asphalt-impregnated kraft paper is of inadequate water-vapor resistance for a 4-mo. period under tropical conditions. Heat-sealing cellophane may permit as much moisture to enter a package through a meter of heat-sealed length as through a square meter of the cellophane sheet. Large packages of most materials display higher moisture-vapor resistance than do small envelopes. Few materials are resistant enough to hold the water-vapor absorption to 2 percent per year under tropical conditions, although a number are effective in preventing more than 2 percent absorption in 4 mo. Included among these are rubber hydrochloride base; duplex or triplex bags of moistureproof, heat-sealing cellophane; a cellophane laminated to cellophane; and coated glassines subsequently laminated

Dehydration of fruits offers important wartime advantages, E. M. MRAK, H. J. PHAFF, C. D. FISHER, and G. MACKINNEY. (Univ. Calif.). (*Food Indus., 15 (1943), No. 4, pp. 59–62, illus. 3*).—The time required for drying fruits by dehydration is usually less than 24 hr., whereas sun-drying requires days (3–21). Dehydration thus effects economies in labor, time, and the amount of equipment tied up. Dehydration is also superior to sun-drying from the standpoint of sanitation and in effectiveness in reducing moisture content to the low levels required for satisfactory keeping quality. By proper blanching of the cut fruit as a preliminary step, the dehydrated product produced is equal to the sun-dried with regard to color and translucency. Fruit thus blanched retains a higher content of SO_2 in the sulfuring operation than does unblanched fruit, this higher SO_2 retention resulting in other changes, namely, improved keeping quality of the product and greater retention of carotene and ascorbic acid. Blanching and dehydration have produced a striking improvement in the products of the dried fruit industry.

Dehydration of pineapple, W. V. CRUESS and E. BALOG. (Univ. Calif.). (*Canner, 96 (1943), No. 14, p. 11*).—Preliminary small-scale experiments indicated that pineapple slices could be readily dried and that the product satisfactorily resisted darkening for a period of at least 4 mos. provided the slices were sulfured prior to dehydration. On the basis of these preliminary trials, a procedure involving preparation of the slices, sulfuring to 1,000 p. p. m., and dehydration in a counter current or a two-stage parallel and counter current dehydrator is suggested for the preparation of dehydrated pineapple slices, which may be sweetened and cooked tender following soaking.

Preservation of food products by freezing, J. H. CLARK (*New Jersey Stas. Cir. 461 (1943), pp. 20, illus. 9*).—General directions are given for the preparation of fruits, vegetables, meat, poultry, game, eggs, and fish for freezing. For the preparation of certain fruits and vegetables more specific directions are given, together with recommendations concerning the choice of varieties. General instructions are also given regarding packaging and preparation of the frozen foods for cooking.

Frozen foods containers and container materials, J. G. Woodroof and W. DuPree. (Ga. Expt. Sta. et al.). (*Refrig. Engin., 45 (1943), No. 2, pp. 75–81, 117, illus. 9*).—The data presented represent the results of more than 5,200 weighings to determine moisture losses over a period of 1 yr. from five frozen products packaged in approximately 100 kinds and combinations of packaging materials. The products were asparagus, snap beans, turnip greens, youngberries, and peaches, and the packaging materials included seven waxed papers, five cellophanes, four cartons, three pliofilms, two parchments, two paper cups, and one tin can. Certain of these were tested in various combinations of carton, liner, and wrapper. The weighings showed that for moisture retention paraffined cartons, cups, wrappers, or liners were much more effective than the same packages or materials unparaffined, thus indicating that any untreated carton or wrapping material can be converted into a very efficient package or packaging material by the use of paraffin. Although latex bags and pliofilm-lined cartons and bags gave the most satisfactory protection from desiccation, they became brittle in storage within from 6 to 18 mo. and developed pinholes and cracks, these effects being due to exposure to air and oxidation.

The experiments also showed that every package required a water-impervious film, but that one such film was enough regardless of whether this was associated with the liner, the carton, or the wrapper. It is pointed out that as long as a product is completely surrounded by one water-impervious barrier and sealed, all other wrappers and cartons add to the bulk and weight but add little to the efficiency of the package.

Frozen food containers and container materials, J. G. Woodroof and W. DuPree. (Ga. Expt. Sta. et al.). (*Quick Frozen Foods, 5 (1942), Nos. 3, pp. 10–11, 36, illus. 2; 4, pp. 16–17, 22, illus. 3*).—Essentially noted above.

How to produce frozen eggs that the housewife can use, P. J. Schaible and C. G. Card. (Mich. Expt. Sta.). (*Food Indus., 15 (1943), No. 5, pp. 67–68, illus. 4*).—The system developed for freezing eggs in a form convenient for the home and suitable for retail distribution involved the freezing of the egg meats in separate or slightly joined units, each of which was equivalent to a medium-sized egg (or egg white or egg yolk where frozen separately). This was accomplished by freezing the cooled egg material in trays equipped with grids so constructed as to furnish the desired size of units. To prevent the frozen eggs from sticking to the metal it was necessary to line the trays with pliofilm or cellophane and to coat the grids with a thin coat of ice. Thus prepared, the frozen egg package permitted the removal of any given number of eggs without the necessity of thawing, the number desired being determined by counting rather than by measuring or weighing. The time required for thawing was short, about 10 min. at room temperature. For distribution of the frozen eggs in this form it is essential to use good shell stock, candle thoroughly, maintain bacteriological cleanliness, and have plenty of refrigeration and properly designed equipment and laboratory control.

Four lessons for the refrigerated locker patron on freezing vegetables and fruits, H. H. Plagge. [Iowa Expt. Sta.]. (*Ice and Refrig., 104 (1943), No. 5, pp. 281–284, illus. 3*).—The four steps discussed for the locker patron are summarized as follows: (1) Select for freezing those vegetables that have flourished during the current crop season and acquired an excellent texture and flavor; (2) be prompt about processing products for freezing, making necessary arrangements beforehand so that fruits and vegetables can be prepared and frozen before they have a chance to wilt or deteriorate; (3) select kinds of fruits and vegetables that freeze well, and their correct varieties; and (4) follow closely the scalding directions for vegetables. Four remaining steps of direct concern to the locker-plant manager include (1) packaging in adequate containers, (2) freezing of the product, (3) storage, and (4) utilization of the product. Salient facts, based on the author's experience, are noted with regard to specific frozen fruit and vegetable products.

How to blanch vegetables for lockers, S. Bull. (Univ. Ill.). (*Quick Frozen Foods, 5 (1943), No. 8, pp. 42–43, illus. 2*).—This article gives simple, concise instructions for blanching and preparing vegetables and fruits for locker storage.

How to cure meat and increase locker capacity, S. Bull. (Univ. Ill.). (*Quick Frozen Foods, 5 (1942), No. 4, pp. 36–37, illus. 1*).—In order to conserve frozen locker space it is recommended that bony cuts of pork be used fresh and that hams, bellies, and picnics be cured and smoked, thus leaving from the average of 110 lb. of meat from a 225-lb. hog only 45 lb. of fresh pork for locker storage. Beef for the locker should be boned. General instructions are given for home curing by sweet pickle cure or dry cure and smoking either in a smokehouse or in a barrel. Directions for artery pumping as a modification of the sweet pickle method are also given.

Effect of locker storage on the quality of pork, E. J. Young and J. A. McIntosh. (Wash. Expt. Sta.). (*Refrig. Engin., 45 (1943), No. 2, pp. 100–103*).—The effect of locker storage at 0° F. for periods up to 4.5 mo. on the quality of pork chops, roasts, and sausage was judged from palatability scores of the cooked samples, and in addition, in the case of chops and roasts, from tenderness scores of the raw meat as measured by the Warner-Bratzler shearing apparatus, and chemical tests for peroxide oxygen and aldehyde as indicators of rancidity development. All samples were cooked without thawing to an internal temperature of 183° in an electric oven maintained at 350°. The results of the tests indicated that the quality of the pork was not decreased by storage at 0° within the time limit (4.5 mo.) of this study. Between 1.5 and 3 mo., the flavor of the fat and the aroma became more intense in the chops but not in the roasts. No significant differences were found in the shearing strength of the chops stored for 1.5, 3.0, or 4.5 mo. The roasts stored for 4.5 mo. were less tender than those held for only 1.5 mo. The chops and roasts averaged 0.28 and 2.12 lb., respectively, before storage. Weight losses of the chops and roasts during storage at 0°, and during cooking, varied directly with the length of the storage period; after 4.5 mo. of storage, respective weight losses in storage were 3.02 and 1.79 percent for the chops and roasts, and total cooking losses were 27.73 and 23.73 percent, respectively. "The peroxide oxygen test seemed to measure quantitatively the degree of rancidity in the fat, whereas the aldehyde test as carried out in this investigation did not prove a reliable index."

Preparation and preservation of juices from certain small fruits, C. S. Pederson and H. G. Beattie. (N. Y. State Expt. Sta.) (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1943), No. 9, pp. 260–264, 281, 287*).—Juice from berries was prepared by hot or cold pressing with a hydraulic press, or extracted by various screening devices. Temperatures were varied, frozen fruits were used, some juices were centrifuged, others homogenized, most of them were pasteurized, some were sweetened, and some were frozen. The results of the various trials are discussed, and the various problems encountered in preparing the juices from different fruits are noted. In general, these pulpy juices possessed too pronounced a flavor to be acceptable as a pure fruit juice, and further, they tended to deteriorate in storage. This led to the preparation of fruit juice blends with apple juice as the dilution medium. The results of these trials, also discussed in some detail, indicated that certain blends gave desirable fruit products, while others did not.

Longevity of pathogenic bacteria in apple juice, J. Forgacs and F. W. Tanner. (Univ. Ill.). (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1943), No. 10, pp. 295–299, 304, illus. 1*).—"Longevity of *Escherichia coli, Eberthella typhosa, Salmonella aertrycke, S. schottmülleri,* and *S. paratyphi* was determined in apple juices varying in pH, total titratable acidity, tannin, and total solids, at room temperatures, 5° C. (41° F.), and —16° C. (3.2° F.). In addition, effects of clarification by filtration through diatomaceous earth and of pasteurization of clarified juice at 81.1° C. (178° F.) were studied. A small laboratory-model glass flash-pasteurizer was devised. Death rate at the three temperatures was logarithmic. *Escherichia coli* in a cloudy Grimes variety apple juice and *Eberthella typhosa* in a clear Jonathan variety juice decreased more rapidly at —16° C. than at 5° C. and least at room temperature. *S. aertrycke* in Grimes juice decreased more rapidly at —16° C. and least at 5° C.; *Escherichia coli* was more resistant than *S. aertrycke* in the same juice. Juice to which tannin and malic acid had been added was considerably more bactericidal than untreated juice. Although Duchess variety juice had a lower pH and greater total acidity than tannin-malic juice, it was less bactericidal, probably because of its lower tannin content. Processing altered the bactericidal property of apple juice. In general, clarified unpasteurized juice was more bactericidal than unprocessed or clarified pasteurized juice."

Tomato paste as a source of tomato juice, G. Lo Coco (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1943), No. 10, pp. 303–304*).—Forty-five commercial tomato juice samples packed by 16 canneries distributed in California, the Middle West, and the East were found to contain on an average 22.4 mg. ascorbic acid per 100 cc. (range by packers, 15.2–28.1 mg. per 100 cc.); 7.20 percent total solids (range, 6.5–7.7 percent), including an average of 0.55 percent salt; 0.35 percent total acidity; and a pH of 4.16. Twenty-two samples of tomato paste packed by a California cannery in the season of September to November 1942 averaged 92.6 mg. ascorbic acid per 100 gm. (range 78.0–121.6 mg.) and 26.5 percent total solids (range, 25.0–31.1 percent). Tomatoes from which the pastes were made averaged 23.9 mg. ascorbic acid per 100 gm. and 5.6 percent solids. Tomato juices prepared from the pastes by diluting them to the same salt-free solids content (6.65 percent) as averaged by the commercial tomato juices gave juices averaging 23.9 mg. ascorbic acid per 100 cc. (range, 20.5–28.3 mg.). Since these juices, prepared by dilution of tomato paste, compared so favorably with the regular commercial juices in ascorbic acid content, it is suggested that the preparation of tomato paste for juice purposes would be a satisfactory procedure. It is considered particularly desirable at present because of the enormous saving in tin effected by canning the paste, which represents a five- or six-fold concentration of the juice.

Large fruit cuts canning costs, L. O. Van Blaricom. (S. C. Expt. Sta.). (*Food Indus., 15 (1943), No. 6, pp. 58–59, illus. 6*).—Data collected from the pilot-plant operations described on the relationship of peach size to pitting rate, packing rate, yield, and labor requirements show that it takes less labor to can large peaches than small, that the yield is greater, and that fewer man-hours are required for pitting and packing. Costs per case, based on costs of labor and fruit, are accordingly less for the larger fruits.

Preserving fruits with sulphur dioxide solution, J. G. Woodroof and S. R. Cecil. (Ga. Expt. Sta. et al.). (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1943), Nos. 5, pp. 132–135, 155, illus. 4; 6, pp. 166–169, 187, illus. 6; 7, pp.*

202–205, 219, 221, illus. 1; 8, pp. 237–241, 253, illus. 2).—Much fruit for shipment to Great Britain under the Lend-Lease program has been preserved by SO_2 solution. This method of preservation was found to be efficient and economical. The present tests, concerned with materials and methods of preservation with SO_2, showed it to be an effective preservative for peaches, strawberries, youngberries, blackberries, and other fruits and pulps. The fruits were graded, freed of foreign material such as caps, stems, pits, etc., washed and drained, and placed in containers where an SO_2 solution was poured over them. Thorough and repeated mixing was necessary to equalize the concentration of the preservative throughout the container. Generally, some calcium salt, either dissolved in the SO_2 solution or sprinkled over the berries before the addition of the solution, was added as a firming agent. "Complete penetration of the preservative took place in from 2 to 24 hr., depending upon the kind of fruit, the degree of ripeness, and the firming agent used. Penetration into firm fruits, as Young dewberries, was slower than with soft fruits, as peaches; it was more rapid with very ripe fruits than with green fruits; it was more rapid without a firming agent. With firming agents the resistance was least with calcium sulfate, followed by monocalcium phosphate, calcium chloride, calcium oxide, and calcium carbonate. With strawberries calcium carbonate was the most effective firming agent, monocalcium phosphate was the next, with little difference in the other three that were used. With Young dewberries, which were quite firm, the most effective firming agent used was calcium chloride, followed by calcium sulfate, with no consistent difference between the other three agents used."

The most difficult step in the utilization of SO_2-treated fruits for preserves was the removal of the preservative during the final processing. Boiling in a steam-jacketed kettle for 20 min. reduced the concentration of the preservative from 2,200 to 200 p. p. m. in 20 min.; this same reduction was attained by boiling in a covered stewpan for from 45 to 60 min. or in an open stewpan for from 60 to 120 min. Mechanical stirring or the bubbling of a current of air through the fruit removed SO_2 too slowly to be practical.

Jams and preserves made from the fruits variously treated were judged for quality, comparisons being made in some cases with products prepared from frozen, canned, or dehydrated fruits. The findings are tabulated and discussed in some detail.

Preserving fruits with SO_2 to aid Lend-Lease program, J. G. Woodroof and S. R. Cecil. (Ga. Expt. Sta. et al.). (*Food Indus., 15 (1943), No. 5, pp. 59–61, illus. 2*).—Essentially noted in the above report.

Improving the quality of preserves made from sulphited peaches. J. G. Woodroof, S. R. Cecil, and H. H. Thompson. (Ga. Expt. Sta. et al.). (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1943), No. 9, pp. 269–272, 283, illus. 2*).—Since plain peach preserves made from peaches preserved by the method noted above never jelled, were usually mild flavored, and were frequently too sweet and lacking in a balance between tartness, acidity, and sweetness, tests were carried out to improve the product. Fully ripe, peeled, seeded, sliced Elberta peaches preserved in SO_2 solution were used. The basic preserve formula involved the use of 28½ lb. sulfited fruit, 21½ lb. sugar, 1 oz. citric acid, and 1 oz. fruit pectin. This was varied by the use of various sugars, the addition of phosphoric or tartaric acid to change the acidity, and the addition of youngberries or peach kernels to increase the tartness. The results of the trials, as evaluated from the score card rating, general appearance, and eating qualities, showed that preserves containing sucrose alone or in combination with dextrose were of better color, flavor, and consistency than those containing corn sirup;

that tartaric acid (0.1 percent by weight of the fruit), or citric acid (0.1–0.2 percent), improved the fruity flavor and effected better balance of sweetness, acidity, and tartness; and that the addition of peach kernels to the peach juice before making it into a sirup, or the use of dewberries or dewberry pulp to the extent of 5–20 percent of the weight of the total fruit, improved the flavor of the product. General directions are given for making satisfactory preserves from the sulfited peaches.

Good jams can be made from SO_2 treated fruits, J. G. Woodroof and S. R. Cecil. (Ga. Expt. Sta. et al.). (*Food Indus., 15 (1943), No. 6, pp. 67–68, 124–125, illus. 1*).—Essentially noted in the above study.

Preserving vegetables by salting, F. W. Fabian and H. B. Blum. (Mich. Expt. Sta.). (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1943), No. 8, pp. 228–236, illus. 4*).—The tests described were conducted on a commercial scale, the vegetables being placed in brine concentrations of 40°, 60°, and 80° salometer. The 40° brine was increased in concentration by 2° salometer per week until 50° was reached and by 1° thereafter until the brine tested 60° salometer, this procedure being designated as 40–2–1. The effectiveness of the process in preserving the vegetable was followed by bacterial analysis (total, acid-producing, and proteolytic bacteria) of the products. The results showed that salting could be used to good advantage in the preservation of green string beans, corn, and okra, since these were successfully preserved at the lower brine concentration (40–2–1) and were apparently not harmed in flavor and texture by fermentation. Peas and green lima beans were not successfully salted, however, since they spoiled readily, were adversely affected by fermentation, and required 70° and 60° salometer brines, respectively, as a minimum concentration, although still higher concentrations were preferable. In general, fermentation resulted in loss of color. Blanched vegetables fermented more readily than unblanched and also lost more of their sugar in the salting process. Salting did not destroy catalase or peroxidase. Freshening (desalting) was accomplished most readily by immersing the vegetables in warm water or in running water. To secure the best flavor in the cooked vegetables, it was found advisable to add a liquor containing citric and malic acids, dextrose, fructose, and sucrose in the approximate concentrations that these occurred in the brining liquor from which the vegetables were removed.

The influence of salting upon vitamins A and C in vegetables, H. B. Blum and F. W. Fabian. (Mich. Expt. Sta.). (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22 (1943), No. 9, pp. 273–275, 283*).—As part of the above study the change in vitamins A and C in the salting process was estimated from determinations of carotene by the method of Petering et al. (E. S. R., 83, p. 438), and ascorbic acid by the method of Bessey and King (E. S. R., 71, p. 137), in the fresh vegetables and the salted products after freshening. The results showed that the loss of carotene and ascorbic acid was greater the lower the salt concentration, and greater in vegetables blanched before salting than in those not blanched. The changes in carotene values from fresh to freshened vegetables varied from +9 percent for lima beans to −51.3 percent for cut string beans in unblanched samples and from −19.7 percent for Alaska peas to −77.8 percent for cut string beans in blanched samples. Ascorbic acid values showed much greater decreases than the carotene values, these changes ranging from −39.6 percent for Alaska peas to −86.1 percent for whole string beans in unblanched samples, and from −48.8 percent for corn to −88.5 percent for whole string beans in blanched samples. Carotene and ascorbic acid were lost in the process of freshening, the loss, as estimated from the change in vitamin values, ranging from 3.4 to 16.8 percent for carotene and amounting in all cases to 100 percent for ascorbic acid.

Research shows how vegetables can be preserved by brining, F. W. Fabian. (Mich. State Col.). (*Food Indus., 15 (1943), No. 5, pp. 65–66, 119–120*).—Essentially noted above.

Physical and chemical changes in cucumber fermentation, I. D. Jones and J. L. Etchells. (N. C. Expt. Sta. coop. U. S. D. A.). (*Food Indus., 15 (1943), No. 1, pp. 62–64, illus. 3*).—A small-scale commercial project on the production of salt stock and dill pickles involved the determination over a period of days of sugar content and titratable acidity of the brine and gas evolution from the brine surface. The curves showing the relationships of the several factors for brines of different concentrations indicated that the use of brines of low salinity during the first days (1–5) of the curing process favored rapid acid formation and the production of a comparatively large quantity of acid, with only relatively small quantities of gas. The use of brines of high salinity, however, retarded the rate of acid formation, greatly reduced the amount of acid produced, and favored a vigorous gaseous fermentation, with the production of a comparatively large number of bloaters.

Eggs and poultry in cookery, T. Hoek (*Union So. Africa Dept. Agr. and Forestry Bul. 237 (1942), pp. 94, illus. 32*).—This compilation points to the importance of eggs in the diet and presents many recipes for the utilization of eggs in cooking. The preparation, cooking, boning, carving, and canning of poultry and the preservation of eggs are also considered.

Proper care of eggs after they get into homes important in maintenance of quality, C. Frischknecht (*Farm and Home Sci.* [*Utah Sta.*]. *4 (1943), No. 2, pp. 3, 4, illus. 1*).—In this preliminary study of the most desirable conditions under which to keep eggs in the home, 20 doz. each of grade A and grade B eggs, candled and selected by an experienced commercial egg grader, were divided into lots of 6 of each grade and placed in the homes of 10 consumers in four locations as follows: (1) In a closed cardboard carton on a shelf in a kitchen cupboard, (2) in an open container and (3) in a closed container, both placed on the bottom of the refrigerator, and (4) in a tightly covered hydrator in the refrigerator. Each day for 1 week each lot of eggs was weighed and each egg in the lot was candled and graded by the same candler.

A marked change in grade occurred in all of the eggs during the week regardless of location, but with a more rapid decrease of quality in the grade A than the grade B eggs. Of the eggs kept in the cupboard, 96.7 percent of those originally graded A were graded C and all of the others had to be graded as "rots." Of the grade A eggs stored in different ways in the refrigerator, 53.3 percent of those in the open container had dropped to B grade and the rest to C grade; in the closed carton 51.7 percent were graded B and the rest C, and of those in the hydrator 95 percent were in the B grade. The loss in weight of the eggs was not great, but notably less in those stored in the refrigerator than in the cupboard, and with the least loss in those stored in the hydrator.

Some cooking qualities of homogenized milk.—I, Baked and soft custard, R. E. Carr and G. M. Trout. (Mich. Expt. Sta.). (*Food Res., 7 (1942), No. 5, pp. 360–369, illus. 3*).—For this comparison whole pasteurized milk, homogenized and unhomogenized, was obtained fresh each day from the college creamery. Fresh eggs from a common supply were separated and recombined in definite proportions by weight in order that the eggs used in each day's series might be homogeneous. The ingredients were combined by weight and the procedures followed identically for the two types of milk. The final products were compared objectively and subjectively. The objective tests on the baked custard consisted of rate of heat penetration during cooking, standing index, amount of syneresis on standing, and the firmness of the custard as measured by a curd tension meter. Viscosity measurements with the MacMichael viscosimeter were made on the soft custards. Both types of custard were scored by a group of staff members experienced in scoring dairy products.

Heat penetration was slower in the homogenized custard during baking, thus lengthening the cooking time by from 15 to 20 min. The baked custard made with homogenized milk gave significantly higher standing index values than those made with unhomogenized milk, both when measured immediately after cooking and after standing for 3 hr., this indicating better gel formation. There was less syneresis on standing in the homogenized milk custard. The soft custards made with homogenized milk were more viscous than the unhomogenized. The judges' scores showed no preference between the baked custards from homogenized and unhomogenized milk, but a decided preference for the homogenized milk in the soft custard. The authors conclude that both baked and soft custards made with homogenized milk were superior in quality to those made with unhomogenized.

Digestibility of high-extraction wheatmeals, T. Moran and J. Page (*Nature [London], 150 (1942), No. 3799, pp. 224–226, illus. 1*).—This paper presents some evidence, based on theoretical calculations as well as experimental findings, to indicate that at a given extraction the digestibility of a high-extraction wheat meal is related to the fiber content and that this is dependent upon the composition of the particular lot of wheat, the conditioning of the wheat, and the method of milling.

Nutrition and diet in health and disease, J. S. McLester (*Philadelphia and London: W. B. Saunders Co., 1943, 4. ed., rev., pp. 849+, illus. 19*).—This volume, noted in an earlier edition (E. S. R., 67, p. 337), attempts in the present edition to revise dietary principles in line with advances in the field of nutrition, and, insofar as possible, to anticipate further developments in this field. The chapter on vitamins has been largely rewritten and brought up to date with revision of the nomenclature and inclusion of the newly discovered vitamins. The discussion of mineral elements has been enlarged and the trace elements included. Dietary requirements have been revised in accord with the recommendations of the Food and Nutrition Board of the National Research Council. Certain revised figures on food composition have been introduced, and losses of nutrients in the storage and processing of foods are considered. The section on diet in disease, particularly the chapter on deficiency diseases, has been entirely revised and material has been added on feeding the aged and on nutrition in industry. The chapter on the feeding of infants is credited to P. C. Jeans and that on nutrition in industry to R. S. Goodhart.

Surveys of the nutrition of populations, J. B. Youmans, E. W. Patton, and R. Kern (*Amer. Jour. Pub. Health, 32 (1942), No. 12, pp. 1371–1379; 33 (1943), No. 1, pp. 58–72, illus. 1*).—Part 1 of this report deals with the methods, procedures, and technics which have been used in a survey of the nutrition of practically the entire population (about 1,200 subjects of all ages, both sexes, and both colored and white) of a rural community in middle Tennessee. The survey consisted in the collection of food consumption records on a household and individual basis, medical and physical examinations, and various laboratory tests. Data are tabulated on the distribution of the subjects according to age, sex, race, occupation, and education, and of the households according to income, and on the relation of food supply to income.

Part 2 reports the findings of the survey with respect to calorie intake as related to age, sex, and race and distribution among carbohydrate, fat, and protein. Overweight and underweight children, as judged by clinical estimates of subcutaneous tissue, are classified by age and race.

All of the groups except the white children from 1 to 6 yr. of age were found to have calorie intakes significantly, and in many cases greatly, below the recommended allowances of the Food Nutrition Board of the National Research Council. "With this there was found a significant and often severe deficiency in mean body weight. Not all subjects were abnormally underweight, however, even among those whose intakes appeared greatly deficient and many were actually obese. Reasons are given for suggesting that the deficiency of calories is not as great as it appears and that in part this may be because the recommended allowances with which the intakes have been compared are unnecessarily high. Errors in the recording of food intake may be responsible in part but cannot explain all the apparent deficiency."

Nutrition in blood regeneration, J. M. McKibbin and F. J. Stare (*Jour. Amer. Dietet. Assoc., 19 (1943), No. 5, pp. 331–335*).—Certain nutritional and medical aspects of the problem of blood regeneration are presented, and the relation to blood regeneration of iron, protein, copper, and other nutritional factors is discussed, with the conclusion that "it is evident that nutrition is of importance in blood regeneration and that good nutrition favors rapid regeneration. It would seem that foods rich in iron and protein in the diet of the average blood donor will generally insure a more rapid return of the blood picture to normal. As a measure of safety the diet should also include liberal amounts of other essentials such as copper, as well as those factors whose relation to blood regeneration in man has not been clearly established, namely, some of the vitamins of the B complex. In general, a diet fully meeting the requirements of the Food and Nutrition Board of the National Research Council, with increased emphasis on iron and protein foods, can be expected to provide optimum blood regeneration."

Dietary recommendations for blood donors, D. F. Turner et al. (*Jour. Amer. Dietet. Assoc., 19 (1943), No. 5, pp. 336–337*).—In this report, prepared by the committee of the diet therapy section of the American Dietetic Association, with criticisms and suggestions from J. B. Alsever, C. A. Elvehjem, R. Leverton, H. S. Mitchell, H. T. Parsons, and G. W. Whipple, the principles summarized above have been applied in constructing a daily menu plan for blood donors, with a sample menu and general suggestions of food combinations rich in the protective foods of the menu plan.

Effect of a good school lunch on the nutritional status of children, A. M. Moser (*South Carolina Sta. Rpt. 1942, pp. 20–22*).—This is a preliminary report of a comparison of the diet scores and growth records of children in two rural schools, in one of which hot lunches were served, while in the other lunches were brought from home and supplemented only with fruit during the first year and fruit and other foods not requiring any cooking during the second. The lunches in the first group provided one-third or more of the average daily requirement for calories and protein and about half of the requirement for calcium, iron, and certain of the vitamins. In both schools height and weight records were kept, examinations by a physician and one dental examination were provided, and blood analyses for hemoglobin and ascorbic acid were made. Information about the health history of the children and the family food supply was secured by home visits, at which time a 2-day food record was obtained.

Scoring of the food records showed that the hot school lunches increased the proportion of children making dietary scores of 70 or more. The fruit available the first year in the unsupervised school did not raise the score appreciably, but the partial lunch served the second year increased the proportion of good scores. Better gains in height were made by the 37 children who were in the supervised school the entire period of study than by the 49 children in the other school. Over half the children in the first group and slightly more than one-third in the second group made 130 percent or more of the expected gains in height.

It is pointed out that the lack of dramatic response to the school lunch shows that 5 well-planned meals out of a total of 21 will not entirely compensate for poor home diets and for inadequate medical and dental care or overcome the effect of years of malnutrition, but can have a definitely helpful effect, especially if accompanied by education in food habits and good health supervision.

General comments, based on the study, have been noted previously (E. S. R., 87, p. 306).

Hemoglobin content of blood of school children, E. J. Lease and J. H. Mitchell (*South Carolina Sta. Rpt. 1942, pp. 66–68*).—In this preliminary report relative findings in hemoglobin values obtained by the acid hematin method on more than 1,000 samples of blood from school children in different communities are reported, and certain factors influencing hemoglobin values are discussed. Children in the schools of communities with relatively high incomes had higher average hemoglobin values than children in schools of communities with low incomes. The children in the school lunch study noted above showed no marked improvement in hemoglobin values as the result of the hot lunches. In one school in which an iron supplement furnishing 70 mg. of iron as $FeSO_4$ was given each child daily, the average hemoglobin values increased appreciably, while in a similar school not receiving the supplement the values remained constant.

Occurrence of brain hemorrhages in choline-deficient rats, G. A. Jervis (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 1, pp. 193–195, illus. 1*).—Changes in the nervous system occurring in young rats of mothers reared on a diet low in choline and high in cystine, symptoms of which have been noted by Sure (E. S. R., 84, p. 421) and György and Goldblatt (E. S. R., 85, p. 569), have been studied histologically. The most striking alterations consisted of extensive hemorrhagic lesions in the cerebellum. These are described and contrasted with hemorrhagic lesions reported in the literature for other vitamin deficiencies.

Evaluation of nicotinic acid nutrition by studies of urinary excretion, G. A. Goldsmith (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 1, pp. 42–43*).—The excretion of nicotinic acid and its derivatives in the urine during a 24-hr. period was determined by the method of Perlzweig, Levy, and Sarett (E. S. R., 86, p. 712) with minor modifications suggested by Dann and Handler (E. S. R., 87, p. 14) on 34 subjects, including 6 normal persons, 18 hospital patients without signs of deficiency disease, and 10 patients with clinical findings indicating deficiency of one or more members of the B complex, including 7 with lesions of pellagra, 5 with evidence of riboflavin deficiency, and 1 thiamin deficiency.

The output of nicotinic acid and acid hydrolyzable derivatives showed no significant differences in the three classes of subjects, but the output of trigonelline was much higher in the normal subjects (average 15.0 mg.) than in the other two groups, 8.6 and 7.77 mg., respectively. However, there was sufficient overlapping in the range of figures in the three groups to make the test valueless as an indicator of nicotinic acid deficiency. A number of subjects from each group were then given test doses of 300 mg. of nicotinamide orally, and the quantity of nicotinic acid derivatives excreted was determined after 6 and after 24 hr. The excretion was almost entirely trigonelline, with the normal subjects excreting practically twice as much in both the 6- and 24-hr. periods as the hospital patients and with little overlapping in the three groups. About 50 percent of the trigonelline excretion occurred in the first 6 hr. The extra excretion of trigonelline in 24 hr. following the administration of the test dose ranged from 18 to 76 mg. for normal subjects, from 0 to 41 mg for the hospital patients without evidence of B deficiency, and from 6 to 21 mg. for patients with vitamin B complex deficiency.

The authors conclude that determination of the amount of trigonelline excreted in a 6-hour period after the administration of 300 mg. of nicotinamide may serve as an index of nicotinic acid nutrition.

Experimental riboflavin deficiency in man, J. J. Boehrer, C. E. Stanford, and E. Ryan (*Amer. Jour. Med. Sci., 205 (1943), No. 4, pp. 544–549*).—In an attempt to determine the length of time required in riboflavin deficiency to develop the superficial vascular keratitis demonstrated by Kruse et al. (E. S. R., 84, p. 707) as occurring in this deficiency, a group of six volunteers, one male and five females, receiving their meals at a university special-diet table, was maintained for 5 weeks on a low-riboflavin diet supplemented for three of the group by 3 mg. of riboflavin daily. Each subject was examined twice a week by the slit lamp and observed for further signs or symptoms of riboflavin deficiency. Neither the subjects nor the examiners knew which ones received the supplementary riboflavin.

No signs of vascular keratitis appeared in the three subjects receiving no riboflavin or in two of the controls. In the third control, however, there was slight evidence of capillary invasion noted on the twenty-second day, and increasing somewhat by the twenty-ninth day. Other signs and symptoms were absent or inconclusive. The authors are of the opinion that the most significant point is not the absence of superficial keratitis in the group not receiving riboflavin, but its presence in one subject receiving a theoretically optimal intake of riboflavin and the failure of the condition to disappear on a normal diet plus additional riboflavin.

Factors influencing ascorbic acid retention in apple juice, C. C. Strachan (*Canada Dept. Agr. Pub. 732 (1942), pp. 31, illus. 2*).—Only the reversibly oxidized ascorbic acid (dehydroascorbic acid) was found in apple juice. Juice freshly expressed from Yellow Newtown apples by hydraulic press was found to contain about 7 mg. of ascorbic acid per 100 cc. After 48 hr. the juice still contained 70 percent of its ascorbic acid and after 2 hr. had lost only slightly more. When freshly canned, by pasteurizing at 85° C. directly in the can which was filled full and then sealed, this juice retained most of its ascorbic acid, but this disappeared rapidly so that in 2 weeks or less the ascorbic acid value was only 0.2 mg. per 100 cc. Deaeration and the use of antioxidants failed to have any beneficial effect. Commercially canned apple juice contained about 0.2 mg. of ascorbic acid per 100 cc. Evidence was secured to indicate that the ascorbic acid oxidizing enzyme in the apple juice was inactivated under commercial conditions at a flash pasteurizing temperature of 76.7°, but was still active at 73.9°

The commercially canned apple juices varied markedly in their gas content, indicating variable fills. Freshly expressed apple juice obtained from a hydraulic press contained about 2.0 cc. of total gas, 0.7 cc. of carbon dioxide, 1.4 cc. of nitrogen, and only a trace of oxygen per 100 cc. of juice. Flash pasteurizing alone reduced this by 50 percent or more. Canning increased the nitrogen content of the juice, and properly filled cans (commercial) contained from 1.0 to 1.25 cc. of nitrogen per 100 cc. of juice. The fortification of apple juice with crystalline ascorbic acid, considered a desirable plan in northern countries where citrus fruits are scarce and expensive, was found to be feasible. This fortification was best accomplished by dissolving the ascorbic acid crystals (20 mg. per 100 cc. of juice) and carefully mixing them into the deaerated juice, which was then flash-pasteurized and canned without delay. An alternate procedure involved dispensing the ascorbic acid directly into each can immediately prior to filling with flash-pasteurized juice. Sealing by displacement with an inert gas removed all but minute traces of oxygen. Juice fortified commercially under these specified conditions retained over 90 percent of the added ascorbic acid in the reduced state after 3 months' storage.

Conserving vitamin C in potato cookery, J. E. Richardson and H. L. Mayfield (*Montana Sta. War Cir. 1* [*1943*], *pp.* [*4*]).—Since ascorbic acid in potatoes undergoes partial destruction in certain cookery practices, a study was made of the extent of these losses in potatoes cooked by several methods commonly employed in the home. The potatoes used were of the Netted Gem variety and had been in winter storage for several months; on the raw basis they averaged 9.1 mg. ascorbic acid per 100 gm. When boiled in salted water after being pared and cut, they lost 18.7 percent of their ascorbic acid, but if boiled in their jackets they retained practically all of this vitamin. The pared, cut potatoes lost less ascorbic acid if cooked in a pressure saucepan at 15 lb. pressure than if cooked by boiling in an open kettle (loss of only 10.9 percent as compared with 18.7 percent, respectively). Holding the pared, cut potatoes in fresh water for several hours prior to cooking was found to increase the vitamin loss in the cooked potato (up to 23.1 percent if boiled or 14.3 percent if cooked in a pressure saucepan), but when held in salted water (2.5 percent, i e., 4 level teaspoonfuls salt per quart of water) the ascorbic acid loss in cooking was less than that occurring when the potatoes were cooked at once after preparation

TEXTILES AND CLOTHING

Textiles, W. H. Dooley (*Boston and London: D. C. Health & Co., 1943, new rev. ed., pp. 790+, illus. 125*).—This textbook, written to meet the needs of students in textile and technical schools of secondary grade, is revised (E. S. R., 52, p. 197) to include new terms and descriptions covering, particularly, new fibers and new finishes; information as to the care of the new textiles; and the information to be gained from informative labeling. Consideration is given to the description and classification of individual kinds of fibers and the fabrics made from them, and to the artistic aspects and distributive methods of textiles. Numerous illustrative experiments are outlined.

Chemically modified wool, W. B. Geiger, F. F. Kobayashi, and M. Harris (*Textile Res., 13* (*1942*), *No. 1, pp. 21–36, illus. 5*).—Previous work (E. S. R., 86, p. 568) showed that treatment of wool with sodium thioglycolate transformed the disulfide groups to more stable ones and gave a product more resistant to alkali. The present paper, reporting improvements in the process for preparing the modified wools, indicates that of the several salts of thioglycolic acid and of other mercaptans used in the treatment of the degreased wool calcium thioglycolate gave products with the best tactile properties and with the greatest stability. Reduction of the wool with this salt by the method described, followed by alkylation with one of several reagents (most effective of which was trimethylene bromide), gave a modified wool that showed improved resistance to alkalies, acids, reducing agents, and oxidizing agents; and greatly enhanced resistance to staining by heavy metals, to digestion by enzymes, and to attack by moths and carpet beetles.

The effect of various storage conditions upon a cotton, a linen, and a wool fabric, R. E. Rogers and M. B. Hays. (U. S. D. A.). (*Textile Res., 13* (*1943*), *No. 6, pp. 20–35, illus. 2*).—To determine the extent of damage to fabrics resulting from different conditions of storage, tests were conducted over a 4-yr. period on new cotton, desized cotton and linen, and degreased wool fabrics which were stored in the light and in the dark at room temperature (average 78° F.) and in the dark at a high temperature (102°) to simulate attic conditions in the summer. To measure the extent of physical and chemical changes produced by storage, tests were conducted on samples taken at the beginning of the study and on others withdrawn at 6-mo. intervals. For cotton and linen fabrics, breaking strength, light reflectance, fluidity in cuprammonium hydroxide, and copper number were determined. Breaking strength, elongation at break, light reflectance, cystine sulfur, moisture, and methylene blue absorption were used to measure wool deterioration.

While none of the fabrics were damaged sufficiently to render them unmarketable, still the tests showed that there was a significant deterioration in certain instances. All tests showed that both new and desized cottons were significantly more deteriorated when stored at the high temperature than at room temperature and that there was definitely more deterioration in the new cotton sheeting than in the desized material. Certain of the tests indicated that linen and wool were also damaged more at the high than at the low temperature. Fluidity measurements for cotton and linen and cystine values for wool indicated that storage in diffused light caused significantly more chemical deterioration than storage in the dark at the same temperature. "As a result of this study it is recommended that fabrics be stored in the dark, at as low a temperature as convenient, and free of finishing material."

HOME MANAGEMENT AND EQUIPMENT

Slip covers for furniture, B. V. Morrison (*U. S. Dept. Agr., Farmers' Bul. 1873, rev. (1943), pp. 26+, illus. 14*).—This represents a very slight revision of the edition noted earlier (E. S. R., 85, p. 285).

REPORTS AND PROCEEDINGS

Twenty-second Annual Report [of Georgia Coastal Plain Station], 1942, S. H. Starr (*Georgia Coastal Plain Sta. Bul. 35 (1942), pp. 154, illus. 12*).—In addition to meteorological data noted on page 517, this report notes progress of work on cotton, corn, peanuts, oats, wheat, rye, flue-cured and shade tobacco, soybeans, forage and cover crops, pastures, beef cattle, swine, dairy cattle, sweetpotatoes, tomatoes, watermelons, lima beans, other truck crops, various fruit crops, and root knot in tobacco, peaches, and soybeans and its control.

Wartime agricultural research: Fiftieth Annual Report of the Idaho Agricultural Experiment Station for the year ending December 31, 1942, C. W. Hungerford et al. (*Idaho Sta. Bul. 251 (1943), pp. 68, illus. 9*).—In addition to several articles noted elsewhere in this issue, this report contains notes of current progress of work at the station and substations in crops, crop breeding, and soils; fruit and vegetable crops; beef cattle, horses, sheep, and swine; dairy production and manufacturing; poultry; agricultural engineering; agricultural chemistry; agricultural bacteriology; farm economics; insects; plant diseases; and nutrition.

Report on agricultural research [of Iowa Station] for the year ending June 30, 1942, II, [R. E. Buchanan et al.] (*Iowa Sta. Rpt. 1942, pt. 2, pp. 85, illus. 8*).—This, the concluding portion of this report (E. S. R., 89, p. 508), presents the seventh annual report of the Iowa Corn Research Institute. In addition to an article on The Commercial Possibilities of Waxy Corn, by R. M. Hixon and G. F. Sprague (pp. 7–11), the progress of investigations is noted on soils and soil management as related to corn production, cultural methods and equipment for corn breeding, botany, pathology, and mycology, insects, corn composition (chemistry and characteristics as a raw product), industrial utilization, corn and corn products in human and animal nutrition, and economic phases of corn production and utilization.

Fifty-fifth Annual Report of the South Carolina Experiment Station, [1942], H. P. Cooper et al. (*South Carolina Sta. Rpt. 1942, pp. 186, illus. 46*).—

In addition to articles noted elsewhere in this issue, results are presented of research at the main station and substations on nonpressure preservative treatment of southern pine posts; crop variety trials; response from basic phosphate slag v. superphosphate; influence of mulches on runoff, erosion, and crop yields; soil fertility as influenced by leguminous plant additions; controlling sand movement in small streams; sprout production of certain strains of the Porto Rico sweetpotato; peach canning costs as affected by size of fruit; seed treatment with reduced dosages of Ceresan for cotton seedling diseases; cross-inoculation with *Fusarium* wilt organisms; tests of new varieties of wilt-resistant cottons; hormones for cottonseed; diseases of the corn plant; cowpea curculio; tomato fruitworm; comparative mineral composition of vegetables grown under various environmental conditions; enrichment of corn products; the effect of the ration on rate and cost of gains and on the quality of beef produced; purebred v. crossbred pigs; sweetpotato meal for fattening hogs in dry lot; the effects of feeding cottonseed meal v. peanut meal upon various properties of milk; an artificial insemination schedule; nurse cow v. artificial methods of feeding milk to dairy calves; comparison of the Small-Type Broad-Breasted White and the Broad-Breasted Bronze varieties of turkeys on range and in confinement; lespedeza as a source of riboflavin for chicks; trichomoniasis in turkeys; fowl leucosis; a comparison of sanitary methods and feeding practices in the control of kidney worms and roundworms of swine; menhaden fishmeal v. a mixture of cottonseed meal and crab meal for fattening pigs; sorghum silage v. rye pasture for wintering stocker steers; sources of nitrogen for cotton; winter legume cover crops; organic nitrogen fertilizers: value of stable manure in cotton production; defoliating cotton with Cyanamid; cotton breeding experiments; cotton insect studies; tobacco variety and curing studies; tobacco diseases; tobacco splitworm; corn earworm on tobacco; salt concentration—fertilizer experiment; lysimeter studies; effect of adding sodium to the fertilizer on yields and composition of cotton plants at different levels of potash fertilization; fungicidal dusts or sprays for tomatoes; sweetpotato fertilizer experiments; control of downy mildew of cucurbits; sweetpotato seed and sprout treatment; peanut seed treatment; and effect of plowing under ammonium sulfate and other fertilizer materials on the yield of corn for grain and for silage.

What's new in farm science: Annual report of the director, [Wisconsin Station, 1942], II, compiled by N. Clark and N. Hoveland (*Wisconsin Sta. Bul. 460* (*1943*), *pp. 87+, illus. 26*).—This, the concluding portion of the report (E. S. R., 89, p. 269), deals with studies on hay and pasture, silage, grain, pig and poultry feeding, potatoes, canning peas, other vegetables, fruits, soil management, forestry, and special subjects. The latter include fly sprays, nosema disease in beekeeping, expeller soybean flour in bee feeding, "rubber dandelion" in Wisconsin, belladonna, sugar beet fertilization, seedbed sprays for tobacco diseases, plant hormones, and Redson flax.

MISCELLANEOUS

Idaho agricultural publications available for free distribution (*Idaho Sta. Cir. 87* (*1943*), *pp. 7*).—A list of the station and extension publications available as of March 1943.

Farm and Home Science, [June 1943] (*Farm and Home Sci.* [*Utah Sta.*], *4* (*1943*), *No. 2, pp. 12, illus. 8*).—In addition to articles noted elsewhere in this issue, this number contains Post-War Agricultural Problems in Utah Defense Area Studied, by W. P. Thomas and G. T. Blanch (pp. 1–2), and Increased Prices and Rates of Production Influence Profits of Sheep Ranches, by D. A. Broadbent (pp. 9–10).

NOTES

Colorado College and Station.—Cattle feeding tests have shown that steers can be fattened without protein supplements when high-quality alfalfa hay is used as the roughage portion of the ration and that the amount of grain may be reduced. Steers fed alfalfa hay, sugar beet tops, wet pulp, and a low level of grain made the most economical gains in a test.

L. A. Moorehouse, head of the department of economics and sociology since its establishment in 1921, has retired.

Florida station.—An act has been approved by the Governor authorizing the board of control to establish and maintain a branch experiment station in the northern part of either Santa Rosa County or Okaloosa County near the county line dividing these counties for the purpose of carrying on experiments in general farm and vegetable crops and livestock and pastures. This branch station is to aid in solving some of the problems of agriculture in the extreme northwestern section of Florida.

Dr. E. M. Andersen, assistant horticulturist of the Subtropical Station, has been transferred to the watermelon and grape investigations laboratory as associate horticulturist. He is acting in charge of this laboratory in the absence of Dr. M. N. Walker, plant pathologist, who is on special assignment with the U. S. D. A. Bureau of Plant Industry, Soils, and Agricultural Engineering. Recent appointments include Dr. Cyril L. Comar, research assistant in chemistry in the Michigan Station, as associate biochemist to conduct research in animal nutrition; Dr. Henry C. Harris, assistant professor and assistant in agronomy in the Delaware University and Station, as associate agronomist for research on pasture grasses and farm crops; and Dr. Roger W. Bledsoe as associate agronomist for research on various farm crops.

Georgia Station.—Dr. G. A. Lebedeff, plant breeder in the Puerto Rico University Station, has been given an appointment in the department of agronomy.

Purdue University and Indiana Station.—Dr. R. B. Withrow, associate in horticulture in the station, has resigned to accept a position in the department of physics in the university and will be succeeded in the station by Alice Withrow as assistant in horticulture. Other appointments include Dr. H. J. Barre, assistant professor and research assistant in agricultural engineering in the Iowa College and Station, as head of the department of agricultural engineering effective September 1; Paul Godfrey and W. R. Lewis as assistant chemists; and Wayne H. Silver as technical assistant is botany. R. C. Baines, associate in botany, has resigned to become associated with the U. S. D. A. plant disease survey.

Kentucky University and Station.—George Roberts, head of the university department of agronomy and agronomist in the station for nearly 40 years, retired on July 1 with the title of professor of agronomy emeritus. He has been succeeded by Edmund J. Kinney, professor of farm crops and agronomist in charge of tobacco and cereal investigations. John W. Nutter, superintendent of the station dairy for 46 years, died August 3 at the age of 78 years. Recent resignations include Laura Deephouse as assistant professor of home economics and John

E. Parsley as assistant chemist in the public service laboratories. H. G. Allbritten has been appointed assistant in agronomy, and Thomas P. Strittmatter, assistant veterinarian.

Maine University and Station.—Dr. A. L. Deering, dean of the College of Agriculture and director of the extension service, has also been given supervision over the station in a program to coordinate the three branches of agriculture in the university. Because of the decreased student enrollment, several members of the college faculty have been transferred temporarily to the station for research on a full-time or part-time basis.

A department of forestry has been established in the station, with a staff consisting of Dwight B. Demeritt as head. Gregory Baker, and J. D. Curtis; all of the university department of forestry and on a half-time basis. Among the projects under construction are the development of more accurate volume tables for the measurement of tree species common in Maine; studies of the efficiency of stoves. furnaces, and other wood-burning appliances, wood-lot management, and artificial pruning of forest trees; and studies of the control of the Norway pine sawfly and a new disease of white pine.

Two other new departments which have also been set up in the station are those of animal industry and crops and soils. These will be in charge, respectively, of Drs. G. M. Cairns and J. A. Chucka. the former on a half-time and the latter on a full-time basis. Both of the departments were developed from the former department of biology.

Dr. Arthur Hawkins, assistant agronomist in the station, has resigned to accept an appointment with the U. S. D. A. Bureau of Plant Industry, Soils, and Agricultural Engineering, but will remain in Maine to carry on research in cooperation with the station. D. B. Lovejoy, assistant soil surveyor, and I. C. Mason, assistant in plant physiology (blueberry investigations), have resigned to go into commercial work. Leave of absence for war work has been granted to Dr. Frederick B. Chandler, associate plant physiologist (blueberry investigations); Andrew E. Watson, assistant agricultural economist; and Merna M. Monroe, assistant home economist. Celia Goos has been appointed assistant in home economics research.

Maryland Station.—Director R. B. Corbett has resigned to become executive secretary for the American Farm Bureau Federation. Dr. W. B. Kemp, head of the department of agronomy, has been designated acting director.

Nebraska University and Station.—Lewis T. Graham, assistant entomologist, and Dr. Henry Walter Smith, instructor in agronomy and assistant in research, have resigned, the former for military service and the latter to accept a position with the Washington College.

Cornell University and New York Stations.—According to a note in *Science*, plans approved by the State Board of Regents, subject to the approval of the Temporary State Commission for Post-War Public Work Planning contemplate the expenditure of $5,619,000 by the College of Agriculture for nine building projects, two of which would cost $1,000,000 each, and of $1.777,926 for nine building units for the station at Geneva.

Dr. William I. Myers, head of the department of agricultural economics, has been designated acting dean of the College of Agriculture.

John H. Barron, whose retirement on March 1 after 29 years' service as extension professor of field crops has been noted (E. S. R., 88, p. 869), died August 10 at the age of 60 years. He was a native of New York and a graduate of the university in 1906. Following 2 years as assistant experimental agronomist in the Pennsylvania College and 3 years in New York State in farming and farmers' institute work, he was appointed in 1911 as the first county agent in that State.

J. C. Hening, assistant professor of chemistry in the State station, has been appointed a civilian research worker in the dairy division of the Chicago subsistence research laboratory in the United States Army Quartermaster Corps.

North Dakota Station.—The station held a Field Day July 26 for some 300 members and friends for the Northwest Farm Managers' Association. Agronomy field trials were inspected for a half day, and the remaining time was devoted to current livestock experiments, especially the control of internal parasites of sheep and of external parasites of cattle. Field Days were also held at the Edgeley Substation on July 28 and at the Langdon Substation on July 31. Special interest was shown by all visiting farmers in the unusual epidemic of pasmo disease on the rust-resisting varieties of flax, the varieties of oats which resist crown rust, and the control of livestock parasites.

Dr. Edgar Martin, instructor and assistant in animal industry in the Arkansas University and Station, has been appointed superintendent of the recently reopened Hettinger Substation and associate animal husbandman of the main station. He will undertake the conduct of livestock research for the farms and ranches of southwestern North Dakota, giving special attention to sheep husbandry. Other appointments include Dr. M. I. Wegner, assistant chemist in the Texas Station, as assistant animal nutritionist, and Eunice E. Kelly, assistant in nutrition research in the Michigan Station, as human nutritionist.

Utah College and Station.—William Peterson, director of the station from 1921 to 1928 and director of the extension service since 1924, retired on June 30 as extension director emeritus and will serve as adviser on agricultural problems. W. W. Owens, assistant director of extension since 1920, has been appointed director of extension.

Dr. Bassett Maguire, curator of the Intermountain Herbarium, has accepted a position as curator of the New York Botanical Gardens and has been succeeded by Arthur H. Holmgren. M. L. Miner, instructor and research assistant in bacteriology in the Michigan College and Station, has been appointed in charge of the new animal disease laboratory at Provo. Dr. Rue Jenson, assistant professor of veterinary science and assistant veterinarian in the Louisiana University and Station, has been added to the veterinary staff, with headquarters at Cedar City, where another laboratory for the diagnosis and investigation of livestock disease will be set up.

West Virginia University and Station.—The department of agricultural chemistry has been reorganized into a department of agricultural biochemistry with subdivisions of (1) plant chemistry and (2) animal chemistry and nutrition. Research in the latter field will be pursued in cooperation with the departments of animal husbandry, dairy husbandry, and home economics. In the field of teaching, a new course—the chemistry of animal nutrition—will be offered. For both divisions a month of extension work will be conducted yearly by a member of the biochemistry staff. Field work will include carrying out information on the newer developments in chemistry related to animal and plant producer groups and bringing in problems for the research workers.

Hazel C. Cameron, associated with the work of the institution in human nutrition from 1926 until early in 1943, died May 6 at Charleston, W. Va., in her fifty-third year.

Wisconsin University and Station.—Dr. E. B. Fred, professor of agricultural bacteriology and dean of the graduate school, has been appointed dean of the College of Agriculture and director of the station, vice Dr. C. L. Christensen.

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RECENT WORK IN AGRICULTURAL SCIENCE[1]

AGRICULTURAL AND BIOLOGICAL CHEMISTRY

Textbook of biochemistry, B. Harrow (*Philadelphia and London: W. B. Saunders Co., 1943, 3. ed., rev., pp. 537+, illus. 118*).—The present edition of a book noted earlier (E. S. R., 80, p. 702) presents considerable expansion of many sections. A greater effort has been made to analyze and evaluate recent developments in the industrial, clinical, and other practical applications of biochemistry, and a new chapter has been added on immunochemistry and chemotherapy.

A textbook of biochemistry, R. J. Williams (*New York: D. Van Nostrand Co., 1942, 2. ed., pp. 533+, illus. 21*).—The present edition of this book retains essentially the original outline of the text (E. S. R., 80, p. 725), but brings the material up to date through introduction of the most outstanding advances in the past few years, particularly in regard to enzymes, vitamins, and intermediate metabolism.

Cytology and cell physiology, edited by G. Bourne (*London and New York: Oxford Univ. Press, 1942, pp. 296+, illus. 104*).—The nature and purpose. . . . The first two lines of the abstract previously printed (E. S. R., 89, p. 284) should read as above.

Effect of change of temperature on relative toxicity of rotenone and phenol, W. A. Gersdorff. (U. S. D. A.). (*Jour. Agr. Res.* [*U. S.*], *67* (*1943*). *No. 2, pp. 65–80. illus. 4*).—The experiments were conducted at temperatures ranging from 7° to 27° C. in 5° increments, and with small goldfish as the test animals. All results were subjected to statistical analysis.

Despite the great dissimilarity in the mode of toxic action of rotenone and phenol, increase in toxicity with increase in temperature was found to be proportionately the same for the two compounds. Phenol was 0.16 percent as toxic as rotenone at any temperature in this range. The ratio of increase was found to be the same for equal increments in temperature, 1.66 for a 5° increment. The geometric increase of relative toxicity (R_T) with arithmetic increase in temperature (T° C.) is summarized by the equation $R_T=0.515e^{0.100T}$. Expressed in liters per gram per minute, the value of toxicity at T° C. for rotenone is $4.66e^{0.100T}$, and for phenol is $0.00736e^{0.100T}$.

With respect to the significance of such data, it is pointed out that toxicity and resistance do not have a simple inverse relationship but are distinct conceptions, the former inherent in the nature of the toxic compound and the latter inherent in the nature of the test animal. Resistance only is affected by change in temperature. Relative toxicity is a function of the chemical compound and remains the same at any level within a range of temperatures not deleterious to the test animal. The criterion of relative toxicity, the minimal product of concentration and survival time, therefore, measures a definite characteristic of the test population.

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[1] The publications abstracted in these columns are seldom available for distribution by the Office of Experiment Stations. In general, application should be made to the Office of Information of the U. S. Department of Agriculture, Washington, D. C., for publications of the Department; to the directors of the State agricultural experiment stations, as listed on page 3 of the cover of this issue, for publications of the several experiment stations; and to publishers of books and journals for material issued by them. Microfilms and photostatic copies, the latter legible without magnifying equipment, may be purchased from the Library, U. S. Department of Agriculture, Washington, D. C. Rates and other details are explained in a previous issue (E. S. R., 87, p. 324).

A survey of the literature on synthetic rubber, with special reference to its history, raw materials employed, and its commercial production, E. I. Fulmer (*Contrib. Iowa Corn Res. Inst.* [*Iowa Sta.*], *3* (*1943*). *No. 1, pp. 62*).—This treatment of the subject is divided into three parts, of which the first summarizes the history of synthetic rubber from Faraday's determination of the empirical formula of the natural product in 1826 to and including developments during the current war. Part 2 consists of extracts and abstracts from the more important books and papers on synthetic rubber taken in chronological order from 1912 to 1942. The third part is the reference list.

Tristimulus specification of the Munsell Book of Color from spectrophotometric measurements, K. L. Kelly, K. S. Gibson, and D. Nickerson. (U. S. D. A. et al.). (*Jour. Opt. Soc. Amer.*, *33* (*1943*), *No. 7, pp. 355–376, illus. 10*).—Spectral reflection curves were determined for each of 421 master standards by means of a recording spectrophotometer at the National Bureau of Standards, the slit widths being approximately 4 mμ. Various corrections were applied to these spectrophotometric data in accordance with methods regularly used for such work at the bureau. Colorimetric computations resulting in tristimulus specifications according to the 1931 I. C. I. standard observer and coordinate system were then made with these data. Four illuminants were used: I. C. I. Illuminants *A* and *C*, representative of incandescent-lamp light and average daylight, respectively, Illuminant *D* (lightly overcast north sky), and Illuminant *S* (extremely blue sky). The trilinear coordinates for the Munsell standards calculated for I. C. I. Illuminant *C* were plotted on large chromaticity (x, y) diagrams and constant Munsell chroma lines drawn in. These diagrams serve to determine the Munsell notation and thereby the Inter-Society Color Council-National Bureau of Standards (ISCC-NBS) color name for any color whose trilinear coordinates and apparent reflectance are given.

Trichromatic specifications of intermediate and special colors of the Munsell system, W. C. Granville, D. Nickerson, and C. E. Foss. (U. S. D. A. et al.). (*Jour. Opt. Soc. Amer.*, *33* (*1943*), *No. 7, pp. 376–385, illus. 1*).—Measurements similar to those referred to in the preceding abstract were made on about 1,000 additional colors which have been interpolated between some of those appearing in earlier editions of the Munsell charts.

Final report of the O. S. A. subcommittee on the spacing of the Munsell colors, S. M. Newhall, D. Nickerson, and D. B. Judd. (U. S. D. A. et al.). (*Jour. Opt. Soc. Amer.*, *33* (*1943*), *No. 7, p. 385–418, illus. 14*).—This report presents the characteristics of a modified and enlarged Munsell solid which was evolved from the 1940 visual estimates of the Munsell Book of Color samples. All three dimensions were carefully reviewed and extensively revised. The newly defined loci of constant hue were extended closer to the extremes of value, while the loci of constant chroma were extrapolated to the pigment maximum. The dimension of value was redefined without substantial departure from the Munsell-Sloan-Godlove scale. By the above changes a solid which approaches more closely to A. H. Munsell's dual ideal of psychological equispacing and precise applicability was produced. The new solid is defined in terms of the I. C. I. standard coordinate system and Illuminant *C*.

A psychological color solid, D. Nickerson and S. M. Newhall. (U. S. D. A. et al.). (*Jour. Opt. Soc. Amer.*, *33* (*1943*), *No. 7, pp. 419–422, illus. 3*).—The authors point out that the ideal psychological solid in cylindrical coordinates would fulfill the following requirements: The dimensional scales would be calibrated in perceptually uniform steps, the units of the several scales would be equated, the surface of the solid would represent all colors of maximum saturation, the volume would be representative of all colors which are perceptibly different, the conditions of stimulation or viewing would be prescribed, and finally, the scales would be standardized in terms of a generally recognized psycophysical system.

In the preparation of a report on the smoothing of the Munsell colors (see preceding abstract, data which permit, for the first time, an approximate fulfillment of all of these requirements became available. Two models, representing, respectively, color perception under usual conditions and under conditions permitting finer distinctions, were constructed and are here discussed and illustrated.

Chemistry of butter and butter making.—V, Methods of determining the pH of cream with standardized acidity and of butter made from this type of cream, C. E. Parmelee, E. W. Bird, and D. F. Breazeale *(Iowa Sta. Res. Bul. 316 (1943), pp. 653–695, illus. 10)*.—In continuation of these studies (E. S. R., 79, p. 99), the hydrogen, glass and quinhydrone electrode systems and colorimetric methods were studied in order to develop methods suitable for pH control of butter made from cream with reduced acidity. A modified Schollenberger calomel half-cell and a test-tube-type quinhydrone electrode were developed. Directions for making them are given. Methods for preparing butter sera for laboratory and for factory use are described. A comparison of the test-tube type of quinhydrone electrode with the Bailey hydrogen electrode indicated that the former is satisfactory for use by the dairy industry. A colorimetric pH method for cream and butter serum is also described. This method checked the quinhydrone method, with the greater number of determinations within 0.3 pH unit for cream and 0.2 pH unit for butter serum (average 0.13 pH unit). The colorimetric method yielded the lower pH in most instances. The colorimetric method could be used to advantage by the small factory that could not afford more expensive and precise methods. A full account of the results observed in the study of the various methods as applied to creams and butters is given, and details of technic necessary for obtaining satisfactory pH measurements in laboratory and factory practice are brought out.

The Minnesota Babcock method applied to concentrated milk, chocolate milk, and ice cream, W. C. Brown and L. M. Thurston. (W. Va. Expt. Sta.). *(Jour. Milk Technol., 6 (1943), No. 3, pp. 136–141, illus. 3)*.—In studies with ice cream and evaporated and condensed milk, the Minnesota method for fat determination (E. S. R., 63, p. 506) failed to give consistent results when there were variations in the temperature and duration of digestion.

A modified Hilger vitameter A, R. J. Taylor *(Analyst, 67 (1942), No. 797, pp 248–254, illus. 6)*.—The vitameter, essentially a simplified absorptiometer which measures the total absorption of a solution over a very narrow wavelength zone at the peak of the vitamin A absorption curve, is discussed critically with regard to its underlying principles, its advantages, and its limitations. The use of a standard dye solution (benzene azo-*p*-cresol) for calibrating the instrument is suggested. This solution, in comparison with the standard glass test piece, gives an absorption curve more closely simulating the vitamin A absorption curve, gives a well-defined maximum at 325 mμ, thus permitting accurate determination of the E (1 cm.) value, and automatically compensates for small errors in cell thickness. Modifications introduced into the instrument include a more versatile electrode holder, a light-tight photographic paper holder, and a pendulum-type photographic shutter. These modifications eliminate the necessity of operating the vitameter in a darkened enclosure and reduce the over-all error of the instrument from ±10 percent to ±3 percent.

The liberation of biotin from the avidin-biotin complex (AB), P. GYÖRGY and C. S. ROSE (*Soc. Expt. Biol. and Med. Proc., 53 (1943), No. 1, pp. 55–57*).—Digestion trials employing solutions of egg white and avidin, containing approximately 0.2 μg. biotin per cubic centimeter, and the several enzymes or tissues tested showed that under the conditions employed biotin could not be liberated from combination with avidin by the proteolytic enzymes pepsin, trypsin, pancreatin, and papain, nor by incubation with liver, kidney, muscle, or blood Oxidation with 0.45 percent H_2O_2 did liberate biotin from the avidin-biotin complex to the extent of from 10 to 20 percent of the biotin originally bound as judged by the amount of yeast active material found.

Vitamin-B_1: Estimation in wheatmeal and brown bread and stability of different forms of vitamin-B_1 during bread-making, E. R. DAWSON and G. W. MARTIN (*Jour. Soc. Chem. Indus., Trans. and Commun., 61 (1942), No. 1, pp. 13–18*).—Thiamin in extracts of wheat meals and breads was determined by a procedure previously outlined (E. S. R., 88, p. 292), involving oxidation to thiochrome, extraction with isobutyl alcohol, and determination of the intensity of fluorescence by visual matching. The extraction methods investigated included (1) extraction with pepsin-hydrochloric acid solution, followed by takadiastase; (2) the same procedure modified to permit adjustment of the pH of the solution to the original level, 2.0–2.4, after 2 hours' incubation and just before the addition of the takadiastase; (3) extraction with hot HCl; and (4) extraction with cold 2.5 percent HCl. For the wheat meals the three latter methods gave comparable and satisfactory results. The pepsin-HCl method without pH adjustment gave lower results, apparently because the buffer effect of the meal caused a shift of the reaction toward neutrality out of the range of optimum activity of the enzyme. For the breads the two acid extraction procedures gave low results, apparently because some of the thiamin present in the dough was phosphorylated or otherwise bound by the yeast cell during fermentation, rendering hydrolysis with takadiastase essential. Since the pepsin-HCl extraction with pH adjusted served satisfactorily for meals and breads, this method was used in subsequent tests on the thiamin content of different types of brown and fortified white breads.

The determined values for thiamin in these breads, compared with the values estimated from the thiamin content of the meals or flours and the bread yield, gave indication of the thiamin losses due to baking. The breads were prepared and baked by normal commercial procedures (British). White breads enriched by the use of thiamin-rich yeast lost 8 percent of their thiamin, those enriched by the addition of thiamin to the flour (0.2 gm. per 280-lb. sack) lost 22 percent of the total thiamin, while those with the thiamin added in aqueous solution to the dough lost 20 percent of the total thiamin. Brown breads made from 85-percent national wheat meal and 98- and 100-percent stone-ground whole meals lost 27, 33, and 35 percent, respectively, and a brown wheat-germ bread (Hovis) lost 19 percent. Differences in types of meals used in this series of tests are indicated by the data reported on their contents of thiamin, ash, and fiber.

Microbiologic assay of natural pantothenic acid in yeast and liver: Influence of clarase digestion, E. WILLERTON and H. W. CROMWELL (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 7, pp. 603–604*).—Yeast and liver preparations assayed for pantothenic acid by the microbiological method of Strong, Feeney, and Earle (E. S. R., 86, p. 588) gave much lower values than those obtained by the chick assay method. Preliminary digestion of 0.5-gm. samples of the preparations with 1.0 gm. of concentrated clarase in a total volume of 10 cc.

for 48 hr. at 37° C. served to release the combined pantothenic acid, since the assay values by the two methods then compared favorably, although those by the microbiological method averaged somewhat lower. Digestion with crude clarase powder, even in double the amount of the concentrated preparation, was inadequate. Digestion of the liver and particularly the yeast preparations with clarase apparently produced or released a substance interfering with the metabolism of the test organism (*Lactobacillus casei*), since progressively lower values were obtained upon increase of the level of the material under test. This effect did not interfere seriously in testing materials of higher potency where test levels were out of range of the inhibiting factor. Assays of the clarase itself also showed the presence of an inhibiting substance, with some lots more than with others. It is pointed out that the dependability and usefulness of the method will be increased when the inhibition phenomenon is overcome.

Colorimetric determination of vitamin C, M. L. Isaacs (*Indus. and Engin. Chem., Analyt. Ed., 14 (1942), No. 12, pp. 948–949*).—The method, described as to preparation of the reagent and procedure, depends upon the formation of a blue reduction product upon the reaction of the ascorbic acid, in an acetic acid extract of the plant material, with the reagent, silicomolybdic acid, produced by the reaction of ammonium molybdate and sodium silicate in acid solution. The reaction is sensitive, 0.01 mg. of the vitamin in 50 cc. of solution producing a discernible color; the reagent is stable and can be kept for long periods; and the blue reduction product is not reoxidized by exposure to air. The depth of color is best estimated by the photoelectric colorimeter (with a red filter), since natural coloring matter in the yellow and red part of the spectrum does not interfere with the test. The method is suitable for the routine determination of vitamin C in fruits, vegetables, and other materials in which the content of reducing substance other than ascorbic acid is low.

Vitamin methods.—III, The reliability of the method for estimating vitamin C by titration against 2,6-dichlorophenolindophenol: 1, Control tests with plant tissues, L. J. Harris and M. Olliver (*Biochem. Jour., 36 (1942), No. 1–2, pp. 155–182, illus. 9*).—In the third study of this series (E. S. R., 87, p. 763), tests with fresh and stored potatoes, freshly gathered black currants, canned sieved black currants cooked with sugar, cabbage cooking water, and dried cabbage showed that results by the chemical titration method agreed with those by biological assay, using either the histological tooth structure method or the curative growth method. These foods were chosen to illustrate supposed objections to the method, such as (1) failure to estimate "combined ascorbic acid," (2) interference by certain nonspecific but unspecified reducing substances, and (3) failure to estimate dehydroascorbic acid. Working directions for the chemical procedure are presented in detail, with special emphasis on (1) the necessity for representative samples; (2) complete extraction, facilitated by the use of a small sample; (3) inactivation of oxidases; and (4) prevention of oxidation. For titration of colored extracts, the procedure of Harris et al., noted below, is recommended. Various fruits and vegetables tested before and after cooking showed no evidence of increase in ascorbic acid due to cooking, thus failing to confirm the alleged increases in cooking supposed to represent a release of bound ascorbic acid. Such an apparent rise is attributed to faulty technic, involving failure to protect against the action of oxidases set free on grinding and shredding, or to difficulty in completely extracting the vitamin from raw fibrous food.

"Interfering substances were not found in measurable quantities in any fresh fruits or vegetables, or various processed materials. Large amounts of SO_2

used as preservative, or abnormal contamination with tin, can both be accurately differentiated from ascorbic acid, if present. . . . The quantity of dehydroascorbic acid normally found in fruits and vegetables was so small as to be of little or no practical significance. The relatively large amount reported by a small minority of workers is attributed to failure to guard against oxidation during the preparation of an extract. . . . Provided that the specified precautions are taken, direct titration of the acid extract against 2,6-dichlorophenolindophenol can be recommended with confidence for all ordinary routine analyses of plant materials as giving the total antiscorbutic activity."

Vitamin methods.—IV, A simple potentiometric method for determining ascorbic acid suitable for use with coloured extracts, L. J. Harris, L. W. Mapson, and Y. L. Wang (*Biochem. Jour., 36 (1942), No. 1-2, pp. 183–195, illus. 5*).—The potentiometric method, described in detail as to the preparation of the electrode, the standard, and the extract, the procedure of titration, and the calculation of results, involves the use of a special electrode consisting of a mercury-coated Pt wire. Before the end point is reached, the electrode behaves like an ordinary Hg electrode, but as soon as an excess of dye is present it becomes like a Pt electrode and registers an increase in e. m. f. from 100 mv. to 310–350 mv. rather than the increase of only 10–30 mv. that would be exhibited by the Hg electrode. Experimental facts support the explanation of this function as a double electrode on the basis that under the oxidizing action of the dye the thin film of mercury on the electrode is converted to Hg_2^{++}.

This potentiometric method was found to give good results with vegetable and fruit extracts, colored or uncolored. Comparisons with the direct visual titration method showed agreements to within 1–2 percent. In control tests ascorbic acid was recovered with an error of less than 0.5–2 percent at concentrations of 0.2–0.02 mg. per cubic centimeter, respectively. An alternative electrometric procedure, described for estimating vitamin C in the presence of high concentrations of interfering reducing substances, involves the use of a polarized bright Pt electrode.

A photoelectric method for the determination of ascorbic acid, H. F. W Kirkpatrick (*Jour. Soc. Chem. Indus., Trans. and Commun., 62 (1943), No. 3, pp. 39–41*).—The photoelectric method described for the determination of ascorbic acid involves the addition of an excess of the dichlorophenolindophenol to the metaphosphoric acid (3 percent) extract of the material, and removal of the unreduced dye with chloroform. The necessary photoelectric measurements are then made on the chloroform solutions thus obtained. The method is independent of the amount of color or turbidity present and has an accuracy comparable with that of direct titration of colorless extracts. Results showing the agreement of the two methods give data on the ascorbic acid of orange juice concentrates, rose hip sirup, black currant concentrate, fresh raspberries, raw and cooked beets, and strawberry jam. The method is simple in operation and can be used with amounts of ascorbic acid ranging from 0.01 to 0.16 mg., or in extracts of plant material with amounts ranging from 0.10 to 0.16 mg.

Vitamin methods.—V, A note on the determination of ascorbic acid in fruits and vegetables in the presence of SO_2, L. W. Mapson (*Biochem. Jour., 36 (1942), No. 1-2, pp. 196–202, illus. 1*).—Two methods are described for the determination of ascorbic acid in extracts of sulfited foods. The one procedure involves prior removal of the SO_2 from a 5-percent metaphosphoric acid extract of the food by means of a current of N_2 and oxidation in vacuo. By the other method, acetone to a concentration of 20 percent is added to the metaphosphoric acid before titration to form the acetone-bisulfite complex that does not reduce the indophenol dye. In this method precautions must be taken to complete the titration in not less than 40 sec. and not more than 60 sec. Tests with these two methods permitted the estimation of ascorbic acid in fruit and vegetable tissues containing SO_2 with an average error of less than 1 percent. The acetone method of titration gave results which were as reliable as those obtained by the normal method, even when cysteine or glutathione were present in equal concentration to that of ascorbic acid.

Detection and quantitative determination of 4-amino-2-methyl-1-naphthol: A synthetic vitamin K, A. R. Menotti (*Indus. and Engin. Chem., Analyt. Ed. 14 (1942), No. 7, pp. 601–602. illus. 1*).—The method described depends upon the interaction of the 4-amino-2-methyl-1-naphthol with the reagent, sodium pentacyanoammineferroate, in alkaline solution to produce an intense blue color. The intensity of color produced is compared by means of a visual colorimeter with that produced by known quantities of the aminonaphthol. The color obeys Beer's law of light absorption and is sufficiently stable to allow time for accurate color comparisons. The absorption curve of a typical solution obtained in the determination is presented. The presence of bisulfite in amounts up to 5 mg. per milligram of the 4-amino-2-methyl-1-naphthol has no effect on the color; quantities above this amount cause the color to develop more slowly and result in the reduction of the final color intensity. The presence of 2-methyl-1,4-naphthoquinone, an oxidation product of the compound under test, has no effect on the development or final intensity of color. The reagent described will detect the presence of 0.0005 mg. of 4-amino-2-methyl-1-naphthol.

AGRICULTURAL METEOROLOGY

Methoden und Probleme der dynamischen Meteorologie [Methods and problems of dynamic meteorology], H. Ertel (*Berlin: Julius Springer, 1938; Ann Arbor, Mich.: Edwards Bros., 1943, pp. 122+, illus. 14*).—This survey of meteorological methods and problems is a photolithoprint reproduction of the original book.

Selected bibliography on meteorology and related subjects (*U. S. Dept. Com., Weather Bur., 1943, pp. 31*).

Advances in dendrochronology, 1943, A. E. Douglass (*Tree-Ring Bul., 9 (1943), No. 3, pp. 18–24, illus. 3*).—This general survey of tree-ring work considers theories and methods; and extensions in prehistory, about the world, and in cycles and climatology.

Waves in the atmosphere and application to forecasting, H. Wexler (In *Proceedings of the Second Hydraulics Conference, June 1–4, 1942,* edited by J. W. Howe and H. Rouse. *Iowa Univ. Studies Engin. Bul. 27 (1943), pp. 234–247. illus. 9*).—The periods of atmospheric waves range from a fraction of a second to several days and even longer. Among the multitude of waves, those most important because of their association with significant weather phenomena are the gravitational and cyclone waves and the long waves in the westerlies. These are discussed, along with summer circulation patterns in relation to forecasting.

Atmospheric turbulence and the measurement of evaporation, C. W. Thornthwaite. (U. S. D. A.). (In *Proceedings of the Second Hydraulics Conference, June 1–4, 1942,* edited by J. W. Howe and H. Rouse. *Iowa Univ. Studies Engin. Bul. 27 (1943), pp. 280–288*).—This is a general review and discussion, including the dynamics of the subject, from which it is concluded that though much remains to be done enough has been accomplished to show that it will soon be possible to measure the evaporation from any natural surface. As the turbulence theory is revised, and as instruments for more accurate measurement of wind velocity and humidity are developed, the computations of evaporation should become more reliable. The future promises that measurements of the transfer of moisture to the atmosphere from all types of geographic surfaces will become available and that they will provide information on the moisture requirements of various crops and types of natural vegetation and on the effectiveness of various moisture-conserving practices. With the accumulation of this information the interrelations of climate, hydrology, and agriculture will be more clearly understood.

Some influences upon American climate of the ocean and gulf: An analysis of climatic charts in "Climate and Man," 1941, S. S. Visher (*Amer. Met. Soc. Bul., 24 (1943), No. 3, pp. 79–84*).—An analysis of these charts (E. S. R., 86, p. 293).

The seasons' arrivals and lengths, S. S. Visher (*Ann. Assoc. Amer. Geo., 33 (1943), No. 2, pp. 129–134, illus. 16*).—Here are presented for the United States maps showing the approximate dates of the usual commencement of the seasons and the average duration of each, with discussion.

Weather-map construction and forecasting in the westerlies from single-station aerological data, W. W. Jones et al. (*Univ. Chicago, Inst. Met., Misc. Rpts. No. 7 (1943), pp. 89+, illus. 49*).—A method of weather analysis and forecasting from single-station data is presented, based essentially on empirically established relationships between the circulation at the 10,000-ft. level and the frontal pattern at the ground, the circulation aloft being determined by pilot-balloon observations. At the same time a series of investigations was carried out to develop satisfactory means of single-station analysis and forecasting, the technic being based essentially on realization of the fact that the vertical distribution of wind direction and velocity, when carefully studied and compared with certain other factors, gives much information concerning the horizontal distributions of tempearture, pressure, and vertical stability and also tells a great deal concerning the rate of propagation of the circulation patterns eastward Certain sections of the report are by H. Riehl, V. Oliver, M. Boyden, V. P. Starr, and C.-G. Rossby, the introduction also being by the last named.

Principal Federal sources of hydrologic data, B. M. Woods et al. (*Natl Resources Planning Bd. Tech. Paper 10 (1943), pp. 76+*).—This is the third in a series of reports[2] on hydrologic data published by this board. It includes information as to the Federal sources of data on droughts, erosion, evaporation, floods, ground water, hail, humidity, water infiltration into soils, precipitation, river and lake stages, runoff, snow, storms, stream flow, wind, and on air, soil and water temperatures, and related matters. The two appendixes summarize hydrologic research data being collected at experimental areas, watersheds, forests, and demonstration projects maintained by Federal agencies, and present the time standards used by Federal agencies for observing, recording, and publishing hydrologic data as affected by transition from standard time to wartime on February 9, 1942.

Hydrologic studies: Compilation of rainfall and runoff from the watersheds of the Shelby Loam and Related Soils Conservation Experiment Station, Bethany, Missouri, 1942, A. W. Zingg. (Coop. Mo. Expt. Sta.). (*U. S. Dept. Agr., Soil Conserv. Serv., 1943, SCT–TP–39, Sup. 2, pp. [44], illus. 26*).—A second supplement (E. S. R., 86, p. 295; 88, p. 594).

Winds of the United States, S. S. Visher (*Sci. Mo., 57 (1943), No. 2, pp. 105–112, illus. 8*).—This summary of the wind types and their influences, important in determining variations in temperature and moisture, is illustrated by eight maps.

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[2] Deficiencies in basic hydrologic data. Washington: Natl. Resources Com., 1936, pp. 66+, illus. 27.
Deficiencies in hydrologic research. Washington: Natl. Resources Planning Bd., 1940, pp. 93+, illus. 33.

Wind influences on the transportation of sand over a Michigan sand dune, H. Landsberg and N. A. Riley (In *Proceedings of the Second Hydraulic Conference, June 1–4, 1942*, edited by J. W. Howe and H. Rouse. *Iowa Univ. Studies Engin. Bul. 27 (1943), pp. 342–352, illus. 9*).—Most of the previous quantitative data on sand transport by wind have been gained in the wind tunnel or in desert areas. A humid region was selected for this study, which concerns the wind structure over the dune, geometrical properties of the sand, and the dynamics of sand transport.

Climate of the Palouse area of Idaho as indicated by fifty years of climatological data on the university farm, K. H. W. Klages (*Idaho Sta. Bul. 245 (1942), pp. 19, illus. 3*).—A transition between true grassland and woodland climates is typical for this area. It has many of the characteristics of the grassland climate but differs in that a high percentage of the moisture comes during winter, the humidity then is relatively high, and above all the area is favored with relatively calm moist air during this period. The area does not have the extreme moisture fluctuations so common to regions with true grassland and definitely continental types of climates and thus is relatively free from the damage of extreme droughts and high fluctuations in crop yields. This accounts for the stability of agricultural production in this region. While the precipitation is fairly low (21.75 in. per annum), the efficiency of moisture utilization is high, as manifested by the large average crop yields obtained. Such yields require not only favorable climatic conditions but also favorable soil relationships—high fertility and moisture-absorbing and moisture-holding capacity. The high percentages of moisture receipts arriving during winter demand that a considerable amount of water utilized by crop plants must be stored in the soil during the annual period when temperatures are too low for crop growth. The high efficiency of moisture utilization characteristic of the area could result only with soil conditions suitable for the storage of moisture received during the winter months. The low intensity of precipitation common to this region definitely enters into the capacity of soils to absorb winter and early spring precipitation. Furthermore, the relatively low temperatures and absence of drying winds during the major portion of the growing season contribute to the efficient use of moisture by the crop plants raised.

Climatological survey for Ohio and Wooster, 1942, J. T. McClure (*Ohio Sta. Bimo. Bul. 222 (1943), pp. 143–144*).

Some effects of the weather on our 1942 crop, J. F. Hockey (*Nova Scotia Fruit Growers' Assoc. Ann. Rpt., 79 (1942), pp. 68–71*).—Seasonal notes on weather conditions in relation to apple orchards in Nova Scotia, with particular reference to pollination and to water core and bitter pit.

Injury to fruit crops by cold on November 12–15, inclusive, 1940, T. J. Talbert. (Univ. Mo.). (*Missouri State Hort. Soc. Proc., 1941–42, pp. 37–41*).

Orchard cold damage resulting from freeze of November 1940, T. J. Talbert. (Univ. Mo.). (*Missouri State Hort. Soc. Proc., 1941–42, pp. 45–46*).

Observation of the damage to Missouri orchards resulting from the November 1940 freeze, W. R. Martin, Jr. (Univ. Mo.). (*Missouri State Hort. Soc. Proc., 1941–42, pp. 47–49, illus. 1*).

Effect of weather on prune crop yields in Napa County, California, J. Janofsky. (*Amer. Met. Soc. Bul., 24 (1943), No. 3, pp. 112–114*).—Over a period of several years prune crop yields in Napa County have varied widely. A study based on local records indicated that killing frosts periodically limit the sizes of crops, but that the main variability was due to other causes. Study of a chart prepared to show the absolute low temperature each winter, the semiannual rainfall for the months January to June, low temperature dates of killing frosts, and prune crop statistics for the county (1927-42) indicated that every year with less than average crop or important decrease in crop from the preceding year was coupled with a warm winter, dry spring, or killing frost, singly or in combination. When the temperature and moisture factors are known in advance, in the absence of a killing frost a helpful method for forecasting the prune crop is available. For example, crops for the 3 yr. preceding 1942 were 9,600, 10,085, and 10,425 dry tons, respectively. Various field estimates placed the 1942 crop at between 8,000 and 10,000 dry tons. The statistical method indicated an increase over the previous years, and allowing for the generally neglected and run-down condition of orchards due to several years of low prices, a crop of 12,000 dry tons was forecast, and 11,200 dry tons were harvested.

Cotton root rot, the weather, and cotton yields, W. N. Ezekiel. (Tex. Expt. Sta.). (*Tex. Acad. Sci. Proc. and Trans., 25 (1941), pp. 63–68, illus. 1*).—The greatest economic damage by this omnivorous parasite (*Phymatotrichum omnivorum*) in Texas is in cottonfields, where root rot often kills the plants in areas so large as to be visible even from airplanes. As a result of the statistical studies presented, it is concluded (1) that the final percentage of root rot within areas of favorable soils is almost exactly a linear function of the rainfall during the several preceding months, with the same amount of rainfall having a greater effect later in the season, and (2) that beyond an optimum amount for a particular month, additional rainfall will not cause further increase in the percentage of root rot. The reason that rainfall more effectively promotes root rot later in the season lies in the fact that young cotton plants are resistant to it. The root rot fungus and the cotton plant are both affected by the rainfall in somewhat the same manner. In years of "favorable" rainfall, yields may be higher even in root rot areas, but this higher yield is still very much less than would be obtained were the disease absent. The disease thus tends to "equalize" cotton production on the particular farms on which it occurs at the drought level, causing meanwhile a percentage crop reduction that approaches the percentage of plants killed by root rot. These factors explain why, when average figures over an area are taken, increased yields may be directly correlated with increased prevalence of root rot.

Techniques in measuring joint relationships: The joint effects of temperature and precipitation on corn yields, W. A. Hendricks and J. C. Scholl. (Coop. U. S. D. A.). (*North Carolina Sta. Tech. Bul. 74 (1943), pp. 34, illus. 18*).—The effects of temperature and precipitation on corn yields in Ohio, Indiana, and Iowa apparently can be measured fairly successfully by the regression equations ordinarily used in joint correlation analysis, and without undue complication when use is made of Fisher's polynomial technic. High temperatures were found beneficial to final yields as the available moisture increased, and detrimental as it decreased. The benefits of above-average precipitation and the detrimental effects of below-average precipitation increased as the temperature was raised. In Ohio and Indiana the temperature and precipitation influences on corn yields were greatest at about the midpoint of the growing season; in Iowa, early in the growing season.

Corn yields apparently cannot be predicted much more accurately from weekly than from monthly weather data, but an analysis based on the weekly data enables a more accurate determination of seasonal variations in the effects of weather factors. Other such factors may be included in the analysis, each one added thereby increasing the number of constants that must be evaluated from the data. In Iowa, some of the recent droughts do not appear to have been occasioned so much by lack of rain or high temperatures as by prevalent hot winds during the growing season, indicating that relative humidity or evaporation rate might be a logical variable to include in future studies of this kind. Infiltration, which determines to a great extent what moisture is available to the plant, might also be added. Furthermore, the weather and yield data used in this study might be replaced by experiment station data to good advantage. Such data would have to be available in sufficient amounts to permit the fitting of equations containing a large number of constants. The assembling of such information by agricultural experiment stations as a long-range project might prove a great contribution to this field of research.

Problemas de fitoecologia com considerações especiais sobre o Brasil meridional [Phytoecological problems with special reference to southern Brazil], F. K. Rawitscher (*São Paulo Univ., Faculd. Filosofia, Ciên. e Letras, Bol. 28, Botânica No. 3 (1942), pp. 3–111, illus. 41; Eng. abs., p. 106*).—This paper is the first of a series of contributions endeavoring to assemble the most important factors influencing Brazilian vegetation. Following an introductory statement, the author reviews his own observations along with the literature (115 references) relative to temperature and humidity as climatological factors, and emphasizes the following points: The quantity of water transpired by a forest with plentiful foliage can be higher than the evaporation from a free-water surface of like area; under similar conditions, the underground water tables in forests reach a lower level than in fields with open vegetation; a large number of apparently dry fields have large water reserves available for the roots in the deeper layers, and in the absence of prairie fires or other damage such areas should be forested; and a great part of south-central Brazil has a forest rather than a savannah climate.

SOILS—FERTILIZERS

Thermodynamics of soil moisture, N. E. Edlefsen and A. B. C. Anderson (*Hilgardia [California Sta.], 15 (1943), No. 2, pp. 31–298+, illus. 47*).—The principles of thermodynamics are applied to a study of the soil moisture system in this comprehensive presentation of the soil moisture field. The discussion includes mathematical theorems to be used in the thermodynamic analysis of soil moisture, the three fundamental laws of thermodynamics and their basic consequences, properties of free energy useful in a thermodynamic study of soil moisture, thermodynamic interrelations among the properties of soil moisture, kinetic theory of soil moisture, the application of thermodynamics to the quantitative description of the state of soil moisture, theory underlying the calculation of the absolute value of the free energy f of soil moisture at any temperature, theory underlying the calculation of the free energy Δfs of soil moisture at any temperature under different conditions, and movement of soil moisture. A section on the definitions of the principal symbols used and a bibliography of 175 references are also included.

Reducing the error in infiltration determinations by means of buffer areas, F. L. Dudley and C. E. Domingo. (Nebr. Expt. Sta. coop. U. S. D. A.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 7, pp. 595–605, illus. 3*).—Detailed information is outlined for a method of determining infiltration designed to overcome the objectionable feature of lateral movement of water. Essentially, the method consists of a smaller plat located within a larger plat. The question of lateral movement is overcome by the preparation of a special buffer area around the plat which was saturated with water. In a comparison of plats having wetted borders with open-field plats without wetted borders, the authors found a 75-percent greater intake of water on plats not prewetted.

Effect of surface stones on erosion, evaporation, soil temperature, and soil moisture, J. Lamb, Jr., and J. E. Chapman. (U. S. D. A. coop. [N. Y.] Cornell Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 7, pp. 567–578, illus. 5*).—The results of this study were determined through the use of large and small field plats and direct weighing soil boxes. Comparisons are made with straw mulch. Removal of surface stones above 2 in. largest dimension on field plats approximately doubled the water runoff and increased soil loss as much as sixfold. A 65-percent stone cover compared to the normal 18-percent stone cover over the soil in weighed boxes slightly reduced the loss of soil water by evaporation, increased water absorption, decreased soil loss, and maintained a relatively high water-holding capacity. A 6-ton per acre straw mulch cover over the soil in weighed boxes reduced the loss of water by evaporation, greatly increased water absorption, prevented soil loss, and maintained a high water-holding capacity. A 65-percent stone cover on field plats increased soil temperatures and maintained a higher content of soil moisture than the 18-percent stone cover. A 4-in. layer of stones maintained a higher content of soil moisture than the 65-percent stone cover. A straw mulch of 6 tons per acre gave soil temperatures at 1 in. depth as much as 24° F. lower than at similar depths under the 18-percent stone cover.

The effect of crested wheat grass on some physical and chemical characteristics of the soil, J. J. Lehane and W. J. Staple (*Sci. Agr., 23 (1943), No. 9, pp. 509–517*).—Representative samples collected from the major soil groups of southwestern Saskatchewan were studied to determine the effect of wheatgrass on the physical and chemical properties of the soils. Coarse-, medium-, and fine-textured soils, under cultivation, with undecomposed sod and the sod decomposed for periods of 5 and 10 mo., were studied.

Decomposed and undecomposed sod samples from coarse- and medium-textured soils showed a large increase in the field capacity, a smaller increase in the wilting point moisture, and thus a net increase in the available moisture-holding capacity. Fine-textured soils showed no significant increases. The sod samples had a higher percentage of organic carbon and nitrogen than did the check. Decomposed samples showed a loss of organic carbon and nitrogen compared to the undecomposed sod. Chemical analyses showed that the decrease in nitrogen was due to the conversion of nitrogen to nitrates. Undecomposed sod samples had the widest C : N ratio. Grass increased the dry aggregation of coarse-textured soils and increased both the dry and wet aggregation of medium-textured soils.

Sand dune stabilization on Cape Cod, K. J. Kucinski and W. S. Eisenmenger (*Econ. Geog., 19 (1943), No. 2, pp. 206–214, illus. 20*).—A well-illustrated presentation and discussion of soil, agricultural, and erosion conditions on Cape Cod. Control measures are given special treatment.

[Soil Survey Reports, 1934 and 1937 Series] (*U. S. Dept. Agr., Bur. Plant Indus. [Soil Survey Rpts.], Ser. 1934, No. 24, pp. 43+, illus. 3; 1937, Nos. 6, pp. 111+, illus. 5; 9, pp. 68+, illus. 3*).—These surveys were made in cooperation with the State experiment station respectively noted: 1934, No. 24, Lucas County, Ohio, G. W. Conrey et al. (Ohio Expt. Sta.); 1937, No. 6, Blackfoot-Aberdeen area, Idaho, E. N. Poulson et al. (Idaho Sta.); and No. 9, Henderson County, N. C., S. O. Perkins et al. (N. C. Sta. et al.).

Physical Land Surveys 27 and 29 (*U. S. Dept. Agr., Soil Conserv. Serv., Phys. Land Survey Nos. 27 (1943), pp. 44+, illus. 18; 29 (1942), pp. 25+, illus. 10*).—No. 27 deals with conditions in Tama County, Iowa, by J. A. Bonsteel, J. A. Elwell, and R. R. Finley; and No. 29 in the Brown-Marshall Soil Conservation District, S. Dak., by L. E. Johnson.

Manure is ammunition in time of war (*N. J. Agr.* [*Rutgers Univ.*], *25* (*1943*), *No. 1, pp. 10–11*).—A practical discussion of the value of farm manure and the importance of proper conservation and use during wartime.

The wealth that flows to sea, R. DeBaun (*N. J. Agr.* [*Rutgers Univ.*], *25* (*1943*), *No. 2, pp. 7–8*).—Data are presented to show the excessively large amounts of plant nutrients lost through sewage. Sufficient nitrogen to fertilize 1,600,000 acres of land is carried away and enough organic matter to improve 140,000 acres of land. During the present condition of reduced supplies of fertilizers, the effective use of wastes offers a promising possibility. The continuance of this tremendous waste can be stopped through the use of technics now known.

Feeding plants for profit taking, V. A. Tiedjens (*N. J. Agr.* [*Rutgers Univ.*], *25* (*1943*), *No. 3, pp. 8–9, illus. 1*).—The author points out the importance of proper fertilization and the relationship of method of application and liquid fertilizers to obtaining maximum vegetable production.

Carbon-hydrogen ratios in organic fertilizer materials in relation to the availability of their nitrogen, E. J. Rubins and F. E. Bear. (N. J. Expt. Stas.). (*Amer. Fert.*, *98* (*1943*), *Nos. 6, pp. 5–7, 22, 24, 26; 7, pp. 8–9, 24, 26*).—Greenhouse pot tests and laboratory nitrification tests were used to determine the availability of 34 organic materials, most of which could be classed as ammoniates. The carbon: nitrogen ratio was found to apply in interpreting the availability of many of the organic ammoniates. This was found to be particularly true of water-soluble nitrogen. In the water-insoluble fractions, ease of decomposition and relative abundance of the associated carbonaceous material must be considered, as well as the decomposability of the insoluble nitrogenous material itself, before a rigid application of C: N ratios to availability can be made.

Nitrogen sources tested 22 years at Delta Station, J. Pitner (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 6, p. 2*).—The response of cotton, oats, and corn to different sources of nitrogen is summarized. Ammonium nitrate produced as good or better yields than the other sources of nitrogen included in the test experiment.

Time, method of applying nitrogen to soils of Delta, J. Pitner and R. Kuykendall (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 6, p. 8*).—The most practical procedure is applying the nitrogen fertilizer at the time the land is being bedded, and this should be followed if it results in the highest yield. The best time of application depends on the soil type to a considerable extent.

Nitrate production as affected by grain-crop residues on the surface of the soil, T. M. McCalla and J. C. Russel. (Coop. U. S. D. A.)' (*Nebraska Sta. Res. Bul. 131* (*1943*), *pp. 21, illus. 3*).—Soil nitrate content and nitrate production were investigated mainly on Marshall silty clay loam at Lincoln, where straw or stalk residues were left on the surface through subsurface tillage, compared with check treatments where these residues were plowed under or were absent.

Where straw mulches were applied to corn between the rows at planting time no significant differences in nitrate content were observed at the end of 30 days. At the end of the season nitrates were lower under 2-, 4-, and 8-ton mulches than under unmulched conditions, but yields were higher. When nitrogen absorption by the crop was taken into consideration, no significant differences in total nitrate production among the various treatments were indicated. At one period during the experiment the corn on the 8-ton mulch plats was spindling and yellow, but nitrates in the soil and in growing corn tissue were high. This corn recovered during a period of dry weather, since it had the most soil moisture, and outyielded the other treatments.

In subtilled and plowed plats planted to sorghum, approximately equal amounts of nitrates were produced during a 5-week early season period where 1.5 tons of straw residues had been left on the surface and where these had been plowed under. In a summer-fallow test with straw residues of 1, 2, and 4 tons per acre, lower nitrate contents were observed at wheat-seeding time where subsurface tillage was employed than where land had been plowed or disked with residue incorporated or absent. Nitrates in all cases were in excess of crop needs, as shown by the yields of wheat which followed. These yields were highest on the subsurface tillage plats. In another summer-fallow test involving the residues of continuous corn, more nitrates were produced during the summer where fallowing was done by subsurface tillage, following previous subsurface tillage for corn, than where plowing was done following previous plowing for corn.

In a corn, oats, wheat rotation where seedbeds for winter wheat were prepared by subsurface tillage and four other common farm methods, nitrate contents under all methods were in close agreement at wheat-seeding time during the first year when all prior conditions were uniform. During a second year of test, nitrates were lower under subsurface tillage than under any other method, due largely to a heavier nitrate usage by previous crops. In the third year of test, nitrates were low under subsurface tillage largely on account of an excessive growth of volunteer oats that was not completely killed until just before wheat-seeding time. In continuous corn land, nitrates were lower, both at the beginning and at the end of the season, where subsurface tillage had been employed for three successive crops with all stalks left on the surface than where plowing had been done with all stalks turned under. However, the total amounts of nitrates produced during the season under the two methods were not radically different when leaching and nitrogen absorption by crop were considered.

The outstanding influence of surface residues revealed by this study was on translocation of nitrates downward. This effect was so large as regards the upper half foot of soil that it was only during very dry periods that nitrates were as abundant at this depth interval under residues as under other treatments. In most instances the influence of residues on nitrates extended beyond the third foot and in some cases even beyond the sixth foot. The authors conclude that all observations of crops and records of yields so far made indicate substantially the same level of nitrate production under subsurface tillage practice with residues on the surface that obtains under the more common methods of tillage and residue disposal.

An appraisal of different phosphatic material as sources of phosphorus for crop plants: A greenhouse study, B. E. Brown. (U. S. D. A.). (*Amer. Fert., 98 (1943), No. 6, pp. 10–11*).—Calcined phosphate, dicalcium phosphate, fused phosphate rock, triple superphosphate, and triple calcium-magnesium superphosphate were compared as to efficiency in a greenhouse pot test, with German millet as the indicator crop. Giving ordinary superphosphate a value of 100, the plant-growth range for other carriers was from 96 to 106.4 percent, thus indicating the generally satisfactory character of all materials tested.

Quenched calcium silicate slag, a by-product substitute for limestone and superphosphate, W. H. MacIntire and S. H. Winterberg (*Amer. Fert., 98 (1943), No. 11, pp. 5–8, 22, 24, 26*).—Because of increased demands for phosphatic fertilizers and liming materials to meet wartime production, this laboratory and greenhouse study was undertaken to determine the value of quenched calcium silicate slag, which is a byproduct in the production of elemental phosphorus. This article presents excerpts from Tennessee Station Bulletin 184 (E. S. R., 89, p. 420).

Cation and anion interchange with zinc montmorillonite clays, M. M. Elgabaly and H. Jenny. (Univ. Calif.). (*Jour. Phys. Chem., 47 (1943), No. 5, pp. 399–408, illus. 2*).—The mechanism of zinc fixation was investigated on colloidal clays of known crystal structure. Montmorillonitic clays were used to determine the fixation relationships. Cation and anion adsorption was studied for the systems sodium bentonite plus zinc chloride, calcium bentonite plus zinc chloride, hydrogen bentonite plus zinc chloride, and for the systems zinc bentonite plus sodium chloride, zinc bentonite plus calcium chloride, and zinc bentonite plus hydrochloric acid. The uptake of zinc from zinc chloride solutions involves the ions Zn^{++}, $(ZnCl)^+$, and $(ZnOH)^+$. The release of zinc from zinc clay by sodium chloride and calcium chloride is restricted mainly to divalent zinc. Zinc clays possess pronounced anion-exchange properties. It is postulated that zinc clay has a mosaic surface capable of independent cation and anion exchange. Some of the zinc adsorbed exists in nonreplaceable form.

Commercial fertilizers in Kentucky in 1942, J. D. Turner, H. R. Allen, and L. Gault (*Kentucky Sta. Regulat. Ser. Bul. 34 (1943), p. 55*).—In addition to the results of inspection and analyses of commercial fertilizers sold in Kentucky, this publication contains information and suggestions relative to the purchasing and use of fertilizers.

AGRICULTURAL BOTANY

The green earth: An invitation to botany, H. W. Rickett (*Lancaster, Pa.: Jaques Cattell Press, 1943, pp. 353+, illus. 100*).—Though this volume sets forth the history and facts of botany from the viewpoints of the scientist and the philosopher, its materials are endowed with such human appeal and picturesque expression as to justify its subtitle: An Invitation to Botany—invitation as well to the layman as to the trained researcher in plant science. Some idea of the scope and approach is suggested by the chapter headings: Of the green color of leaves and what comes of it, of the anatomy of leaves, of the architecture of plants, of the growth of plants, of the purposes of plants, of flowers and their fruits, of the likeness of peas in a pod, of names, of fern and moss, new worlds for old, and the end of things. As suggested by their titles, the last two chapters deal, respectively, with the origin and evolution of plant life and with the fungi and bacteria and their place in the cycle of nature. A prologue prepares the reader for the author's approach, and an epilogue rounds out his philosophical treatment of the subject. The illustrations are rather unique in having been "designed not only to assist in the exposition of detail but to offer a glimpse into the beauties of science."

The introduction of new viewpoints and scientific concepts in general botany, J. F. Stanfield (*Science, 98 (1943), No. 2538, pp. 164–166*).—The suggested methods and approaches for teaching general botany at the college level are designed to stimulate interest, clarify important structures and processes, and stress practical applications, emphasis being on the use of growing plants as laboratory material.

Plants we eat and wear, H. E. Jaques (*Mt. Pleasant, Iowa: Author, 1943, pp. 171, illus. 328*).—This is an illustrated popular key to the plants upon which man is directly dependent for his food and clothing, with some essential facts about each plant. In addition to the subject index, including both common and Latin names, a plant list arranged by taxonomic groups is provided.

The common names of plants and their meanings, W. N. Clute (*Indianapolis, Ind.: Willard N. Clute & Co., 1942, 2. ed., pp. 164+*).—The author has "attempted to unravel a few of the terms that have been applied to the common plants of our fields and woods."

Advance in phylogenetic position in the cryptogams as indicated by their fats, J. B. McNair (*Lloydia, 6 (1943), No. 2, pp. 155–156, illus. 1*).—Differences in iodine values, molecular weights, and melting points of seed fats have already been determined among angiosperms of temperate v. tropical regions and also according to position in the evolutionary scale. Evidence is here presented favoring similar relationships among representatives of the bacteria and the fungus groups Phycomycetes, Ascomycetes, and Basidiomycetes.

Practical values from taxonomic research [in bacteriology], R. S. Breed. (N. Y. State Expt. Sta.). (*Jour. Bact., 46 (1943), No. 2, p. 221*).—An abstract.

Statistical methods and control in bacteriology, C. Eisenhart and P. W. Wilson. (Univ. Wis.). (*Bact. Rev., 7 (1943), No. 2, pp. 57–137, illus. 7*).—In this analytical review (125 references), the literature serves primarily as a source of more or less familiar examples useful for illustrating the statistical principles discussed, and the extension to data which differ in content but not in principle should not be too difficult and "is an exercise left for the reader." Part 1 deals with variables, in which application of the knowledge of different types of distribution is illustrated by examples of statistical control of laboratory procedures In contrast, the arithmetic of the statistical tests of significance discussed in part 2 is given in some detail since this facilitates an understanding of their application to actual data.

The problem of the logarithmic order of death in bacteria: A critical discussion, O. Rahn. (Cornell Univ.). (*Biodynamica, 4 (1943), No. 86, pp. 81–130, illus. 15*).—This discussion (about 50 references) considers the order of death in general and in multicellular v. unicellular organisms, the cause of the logarithmic order of death, conditions resulting in a nonlogarithmic order of death, and biological consequences of the logarithmic order of death. There are 48 references.

Agar from South African seaweeds, W. E. Isaac, M. H. Finlayson, and M. G. Simon (*Nature [London], 151 (1943), No. 3836, p. 532*).—The extraction of agar suitable for bacteriological purposes is reported for the following species: *Gelidium cartilagineum, Gracilaria confervoides,* and *Suhria vittata.* Jellies of limited applicability were found in other seaweeds.

A study of the bacterial flora of pulp and paper mill waste, R. G. Tischer and C. S. McCleskey. (La. State Univ.). (*La. Acad. Sci. Proc., 6 (1942), pp. 50–51*).—The following 4 genera and numbers of strains were represented among 308 isolates from pulp and paper mill waste: *Bacillus* (24), *Alcaligenes* (138), *Micrococcus* (30), and *Flavobacterium* (56). A group of 60 strains of nonsporing gram-variable red-pigmented rods were not identified with any previously described genus.

Spectrochemical analysis of vegetative cells and spores of bacteria, H. R. Curran, B. C. Brunstetter, and A. T. Myers. (U. S. D. A.). (*Jour. Bact., 45 (1943), No. 5, pp. 485–494*).—Evidence is presented to indicate that this method may be advantageously used to determine the elemental composition of bacteria, 12 aerobic species having been thus analyzed in their vegetative and spore stages. Spores were materially higher in Ca and lower in K than the vegetative cells, but the latter were higher in P and somewhat lower in Cu and Mn. Though there was apparently no direct correlation between elemental composition and degree of heat resistance, high Ca concentrations were in general associated with enhanced heat tolerance and resistance.

Potassium in bacterial fermentation, J. Leibowitz and N. Kupermintz (*Nature [London], 150 (1942), No. 3799, p. 233, illus. 1*) —A preliminary note on evidence for the conversion of sugar into a polysaccharide in the initial stage of sugar desmolysis by bacterial fermentation and for a close coincidence in time between the maximum of polysaccharide accumulation and the maximum of K absorption in the bacteria. It is believed that K has a specific function in the synthetic reaction with which fermentation begins.

Studies on the metabolism of autotrophic bacteria, I, II. (Univ. Wis.). (*Jour. Gen. Physiol., 26 (1942), No. 1, pp. 89–102, illus. 2; 103–117, illus. 2*).

I. *The respiration of Thiobacillus thiooxidans on sulfur*, K. G. Vogler, G. A. LePage, and W. W. Umbreit.—The data here presented are believed to indicate that: The "energy of activation" of S oxidation by *T. thiooxidans* is similar to that of other respirations. The pH of the menstruum does not influence the respiration on S at pH 2–4.8, once contact between the bacterial cell and the S particle has been established, but it does influence the rate at which such contact occurs. The pO_2 has little effect on the respiration of this organism. Most organic materials have no detectable effect on its respiration, but the organic acids of terminal respiration seem to stimulate the respiration in the absence of oxidizable S and certain of them inhibit S oxidation. Insofar as inhibitor studies on intact cells are trustworthy, S oxidation goes through Fe-containing systems similar to cytochrome. It is possible that the O_2 contained in the H_2SO_4 formed during S oxidation is derived from the O_2 of the water.

II. *The nature of the chemosynthetic reaction*, K. G Vogler.—CO_2 was fixed by "resting cells" of *T. thiooxidans* and the physiological condition of the cell proved of considerable importance in determining the process. Fixation occurred in the absence of oxidizable S in "young" cells and its extent appeared to depend on the pCO_2. CO_2 fixation also occurred anaerobically without influence by the presence of S, but only a limited amount of CO_2 was fixed in its absence. Relatively short periods of S oxidation restored the ability of cells to fix CO_2 under conditions where S oxidation was prevented. It proved possible to oxidize S in the absence of CO_2 and to store the energy thus formed within the cell, whereupon it was then possible to use this energy for fixing CO_2 in the absence of S oxidation. Cultures respiring on S utilized CO_2 in a reaction proceeding to 0 concentration of CO_2 in the atmosphere. CO_2 may act as an oxidizing agent for S, and it is possible to selectively inhibit S oxidation and CO_2 fixation. Hydrogen is not utilized by *T. thiooxidans.*

The pigment production of Actinomyces coelicolor and A. violaceus-ruber, J. E. Conn. (N. Y. State Expt. Sta.). (*Jour. Bact., 46 (1943), No. 2, pp. 133–149, illus. 7*).—Chemical and spectrophotometric studies indicated that identical pigments are produced by two strains of *Actinomyces* isolated from soil and at first thought to be distinct species due to color differences noted on superficial observation. This pigment was very similar to but not identical with azolitmin, the best known constituent of litmus. These two strains were so much alike in culture characters as to be considered a single species, which is the same as *Streptothrix coelicolor* of Müller and *A. coelicolor* of Kriss and listed in the fifth edition of the Bergey Manual (E. S. R., 81, p. 489) under the latter name. *A. violaceus-ruber* Waksman is said to be quite different both in culture characters and in pigment chemistry and should therefore probably be considered distinct. The method of comparing such cultures by spectrophotometric study of partially purified pigments proves sufficiently promising to recommend its use with other pigment-producing actinomycetes.

Formation of tyrothricin in submerged cultures of Bacillus brevis, J. L. Stokes and C. R. Woodward, Jr. (*Jour. Bact., 46 (1943), No. 1, pp. 83–88, illus. 1*).—The bactericidal substance tyrothricin was synthesized by *B. brevis* in shallow stationary cultures of complex nitrogenous media but was not formed (or at least did not accumulate) in aerated submerged cultures of such media. However, tyrothricin was formed in both submerged and stationary cultures in a synthetic medium consisting of glucose, inorganic salts, and asparagine. Glycocoll, *d*-glutamic acid, and other amino acids can be substituted for the asparagine. Tyrothricin was not produced in synthetic media under sugmerged conditions in the presence of a mixture of 19 amino acids. Its failure to appear in submerged cultures containing complex nitrogenous substances is thus believed to be associated with the amino acids of the latter.

The B-vitamin requirements of the propionibacteria, R. C. Thompson (*Jour. Bact., 46 (1943), No. 1, pp. 99–104*).—Of the nine propionibacteria studied, five grew well through repeated subculture on a synthetic medium to which was added a charcoal-treated "vitamin-free" casein hydrolysate. All five required pantothenic acid; four required biotin. Under the experimental conditions, niacin, riboflavin, pyridoxin, inositol, and folic acid were without stimulatory effect, but the roles of thiamin and *p*-aminobenzoic acid were somewhat obscure. This work and studies by others appear to support the conclusion that the group as a whole is endowed with rather remarkable adaptive capacities. *Propionibacterium pentosaceum*, *P. rubrum*, *P. zeae*, and *P. arabinosum* apparently require a factor or factors (present in yeast extract) in addition to the eight B vitamins here considered. It is noted that, except for *P. technicum*, all strains were stimulated by yeast extract over and above the stimulation by the eight B vitamins.

Geographical distribution of fungi, G. R. Bisby (*Bot. Rev., 9 (1943), No. 7, pp. 466–482*).—As a result of this analytical review (37 references), the author presents a revised summary to replace the one made 10 yr. ago,[3] concluding that "species of phanerogams acceptable today outnumber such species of fungi by about five to one. There are perhaps three times as many phanerogams as fungi on earth. Nevertheless, species of fungi can be expected to outnumber species of phanerogams in any particular State or country. In other words, the average range of a fungus is the greater. The smaller the area surveyed, the more the fungi predominate. Though certain fungi were doubtless among the most primitive inhabitants of the earth, they have come to depend largely on phanerogams and their remains. Saprophytic fungi generally have wider distribution than parasitic. Distribution of hosts and substrata primarily controls distribution of fungi. A parasite is commonly able to attack more than one species of host, so that its range can be greater than that of any one of its hosts. Climate has an important influence on many fungi. Even obligate saprophytes may be limited to certain climatic areas. Other factors, including the nature and density of phanerogams, light, and particularly the activities of man, influence the distribution of many fungi."

Flora micológica del aire en Buenos Aires y sus alrededores [Fungus flora of the air in Buenos Aires and its environs], P. Negroni and I. Fisher (*Rev. Inst. Bact. "Dr. Carlos G. Malbran" [Argentina], 11 (1942), No. 2, pp. 228–242, illus. 16; Fr. abs., pp. 241–242*).—Isolations of 388 strains of fungi were made, for the most part belonging to different species. *Penicillium* led with 93 strains, followed by *Cladosporium*, *Aspergillus*, *Alternaria*, and *Actinomyces*, with others represented by 18 strains down to many with only one each. No definite conclusions were made as to a curve of frequency of the different fungi in relation to seasons of the year, but a greater frequency of *Penicillium* and *Cladosporium* was noted for winter and spring and of *Aspergillus* and *Alternaria* for spring and summer.

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[3] Amer. Jour. Bot., 20 (1933), No. 4, pp. 246–254.

South African Xylariaceae, J. H. Miller (*Bothalia, 4 (1942), No. 2, pp. 251–272*).—This monographic study of the fungus family Xylariaceae includes new taxonomy. A key to the eight South African genera, as well as keys to species of the larger genera (*Hypoxylon* and *Xylaria*), are provided.

Revised descriptions of South African species of Phyllachora and related genera, E. M. Doidge (*Bothalia, 4 (1942), No. 2, pp. 421–463*).—This is a monographic study (including new taxonomy) of the fungus family Phyllachoraceae as represented in South Africa, largely of the genus *Phyllachora*. Species excluded or doubtful are noted, and an index of fungi and host plants is provided.

A revision of the South African Microthyriaceae, E. M. Doidge (*Bothalia, 4 (1942), No. 2, pp. 273–420, illus. 76*).—This monograph on the fungus family Microthyriaceae includes keys to the 12 South African genera and to the species under each, an annotated list of the species excluded, data on *Asterostomella* forms, Latin descriptions of the 28 new species and varieties, a host index by plant families, and an index to fungi and hosts.

Additions to the Uredinales of Venezuela, II, F. D. Kern and H. W. Thurston, Jr. (Pa. Expt. Sta.). (*Mycologia, 35 (1943), No. 4, pp. 434–445*).—Previous additions (E. S. R., 80, p. 167) comprised 22 species. This contribution adds 33 species in 11 genera, bringing the total to 238 rust fungi reported from Venezuela.

Uredinales from the northwest Himalaya, G. B. Cummins. (Ind. Expt. Sta.). (*Mycologia, 35 (1943), No. 4, pp. 446–458, illus. 7*).—About 70 species of rust fungi are reported, 4 of which are described as new.

North American species of Galeropsis, Gyrophragmium, Longia, and Montagnea, S. M. Zeller. (Oreg. Expt. Sta.). (*Mycologia, 35 (1943), No. 4, pp. 409–421, illus. 1*).—This study of four fungus genera belonging to the Gasteromycetes involves new taxonomy, including the new genus *Longia*.

Studies on antibacterial products formed by molds.—I, Aspergillic acid, a product of a strain of Aspergillus flavus, E. C. White and J. H. Hill (*Jour. Bact., 45 (1943), No. 5, pp. 433–442, illus. 1*).—From cultures of an *A. flavis* strain on tryptone solutions, a crystalline substance, aspergillic acid, was isolated which exhibited antibacterial activity against certain gram-negative and gram-positive bacteria. This substance of empirical composition $C_{12}H_{20}N_2O_2$ is of relatively high toxicity but has shown no protective action against mouse infections with hemolytic streptococci or pneumococci. A short series of tests has indicated protection against infections with gonococci and mucin, and workers elsewhere have reported protective action in guinea pigs against gas gangrene.

Studies on Aspergillus flavus.—I, Biological properties of crude and purified aspergillic acid, H. Jones, G. Rake, and D. M. Hamre (*Jour. Bact., 45 (1943), No. 5, pp. 461–469, illus. 3*).—Two variants have consistently given far higher yields of the active antibiotic substance than those noted above. Addition of brown sugar to the 2 percent tryptone-0.5 percent NaCl medium increased the yield of crystalline aspergillic acid from 250 to 400 mg. per liter. The time required to reach full titer in this medium was longer than with the plain tryptone medium. Sporulation of mycelial mats was not essential for aspergillic acid production. Assays by means of interference with the bioluminescence of *Photobacterium fischeri* could be read within 30 min. and so closely paralleled those by the antibacterial test with *Streptococcus pyogenes*, which took 18 hr., as to replace the latter test. Aspergillic acid was found to have wide activity, proving very active against gram-positive cocci and less so against the gas gangrene anaerobes and gram-negative bacilli. No evidence of significant difference was found in the spectrum of activity shown by early filtrates, later filtrates, or by solutions of purified aspergillic acid.

Large-scale production of penicillin, C. E. Clifton (*Science, 98 (1943), No. 2533, pp. 69–70*).—Continuous production of penicillin was effected by means of a culture solution trickling through a column of wood shavings in a set-up (similar to the "quick" process for making vinegar) supporting a growth of *Penicillium notatum* and drained off below. The prevention of bacterial contamination appeared to be the most difficult, though not unsurmountable, obstacle to the production of penicillin on a large scale. In this preliminary work, one set-up continued in satisfactory operation and free from contamination for 15 days.

Dendrochronology in northern Alaska, J. L. Giddings, Jr. (*Ariz. Univ. Bul., 12 (1941), No. 4, pp. 107, illus. 38*).—"The object of this paper [published jointly with the University of Alaska] has been to present the climatological and archaeological results so far achieved by cross-dating the trees of Alaska, as well as to point out the applications of tree-ring work there to other branches of science. In this, as in any field of research, it has been necessary first to test the possibilities of the subject and then its limitations under special conditions. In Alaska great importance has been found to lie in the choice of material, both of living trees and of dead logs."

Check list of the trees and shrubs of Rhode Island, J. E. Howland (*R. I. State Col. Ext. Mimeog. Cir. 21 (1942), pp. 33+*).—This includes 675 species arranged in two alphabetical lists—one by Latin binomials and the other by common names.

The status of certain anomalous native crabapples in eastern United States, R. McVaugh. (U. S. D. A.). (*Bul. Torrey Bot. Club, 70 (1943), No. 4, pp. 418–429, illus. 3*).—At various eastern United States localities trees occur which are undoubtedly derived from native American sources but which do not comprise a homogeneous stock and which occur as anomalous or isolated individuals or groups in the midst of undoubted native populations and are morphologically and physiologically intermediate between native species and the introduced cultivated apple. This series of forms is usually characterized by fruit larger than that of the American crab apples and by leaves with a lesser degree of lobing than in the native species. It is inferred from observation and comparisons with hybrids of known origin that most if not all of the plants previously referred to *Malus platycarpa*, including probably the original material and that of var. *hoopesii*, are of hybrid origin. It is presumed that hybridization has taken place between cultivated apples and native species of *Malus*, section *Chloromeles*, occurring in the same region, but experimental proof is not yet forthcoming.

Inactivation of the browning system in dried apples, F. E. Denny (*Contrib. Boyce Thompson Inst., 13 (1943), No. 2, pp. 57–63, illus. 1*).—It was previously shown (E. S. R., 73, p. 762) that the browning of cut apple tissues on exposure to air could be stopped by dipping into a 0.1-percent thiourea solution. However, if such dried apples were later soaked to an excess of water the tissue promptly turned brown. The present study indicates that if dried apple slices obtained as a result of thiourea treatment are heated for about 1.5 hr. at 80° C., the tissue may then be soaked in water without development of the brown color. The thiourea protects the cut surface from browning during drying, the inactivation of an essential component of the browning system of the internal portions of the tissue being then accomplished by means of heat. It is shown that the organic peroxide and peroxidase constituents of the browning system were both present in the active condition in the dried slices previous to heating; the heating then destroyed only the peroxide component, leaving the peroxidase still active. It is also shown that by use of thiourea a dried apple pulp in the form of thin sheets may be obtained, and that when this dried product is soaked in water no browning of the pulp follows.

Vitamin deficiencies of fifty yeasts and molds, P. R. Burkholder and D. Moyer (*Bul. Torrey Bot. Club, 70 (1943), No. 4, pp. 372–377*).—When the vitamin requirements of 33 yeasts and 17 mold fungi were investigated in chemically defined media, biotin and thiamin deficiencies were found to occur most commonly. Deficiencies for pyridoxine, pantothenic acid, inositol, and niacin were also noted in several yeasts.

A further note on the production of thiamine by Actinomyces, J. A. Herrick and C. J. Alexopoulos (*Bul. Torrey Bot. Club, 70 (1943), No. 4, pp. 369–371*).—In view of previous findings (E. S. R., 88, p. 458), it appeared desirable to test other actinomycetes for thiamin production. Accordingly, 20 species of *Actinomyces* and 2 of *Proactinomyces* were investigated and all found to support considerable growth of *Phycomyces blakesleeanus*. It is therefore concluded that they all produce thiamin or its intermediates or precursors in culture, indicating that this capacity is at least widespread in the group.

Synthesis of riboflavin by lactose-fermenting yeasts, M. Rogosa (U. S. D. A.). (*Jour. Bact., 45 (1943), No. 5, pp. 459–460*).—The yeasts studied included species of *Saccharomyces, Zygosaccharomyces, Monilia, Mycotorula, Torula,* and *Torulopsis*.

Synthesis of riboflavin by a yeast, P. R. Burkholder (*Natl. Acad. Sci. Proc., 29 (1943), No. 6, pp. 166–172, illus. 4*).—Certain yeast strains grown for 4–6 days in synthetic media produced 10–60 μg. of riboflavin per cubic centimeter of fermented liquor, depending on environal conditions. High yields were obtained by supplying certain organic N compounds. Addition of hydrolyzed casein permitted excellent growth but inhibited riboflavin formation. Sucrose, dextrose, or levulose served as suitable sources of C for both growth and riboflavin production, but synthesis of this vitamin was inhibited by maltose or galactose though growth was not diminished thereby. Appropriate concentration of salts, a 30° C. temperature, and suitable aeration were important for efficient yields of the vitamin, but under anaerobiosis its production was inhibited without decrease in growth. Small amounts of cyanide stimulated the vitamin production but inhibited growth. It is thus apparent that synthesis of protoplasm and of riboflavin are related in different ways to the utilization of various compounds in the substrate. The ability of the yeast to synthesize extraordinary amounts of riboflavin seems to be genetically determined, but the extent to which this capacity is expressed depends a great deal on culture conditions.

Riboflavin-vitamin B$_2$ in soil, C. C. Carpenter (*Science, 98 (1943), No. 2535, pp. 109–110*).—Evidence is presented that riboflavin is present in the soil and is correlated directly with the amount of organic matter therein, and that plants (tomato, tobacco, fuchsia, and carrot used) take it up as they can absorb minerals from the substrate.

Some observations concerning riboflavin and pantothenic acid in tomato plants, J. Bonner and R. Dorland (*Amer. Jour. Bot., 30 (1943), No. 6, pp. 414–418, illus. 1*).—Higher concentrations of both vitamins were found at the apex of the plant and in young leaves than at the base or in older leaves. Pantothenic acid accumulated above a basal girdle made by steaming tomato plants at the second node and also on the laminar side of girdled petioles of mature leaves. Riboflavin failed to accumulate to any marked degree above girdles at the base of the stem or on the petioles.

Pseudopyridoxine and certain fungi, W. J. Robbins and R. Ma (*Natl. Acad. Sci. Proc., 29 (1943), No. 6, pp. 172–176*).—Eight filamentous fungi (*Ophiostoma catonianum, Ceratostomella ips, C. microspora, C. montium, C. multian-*

nulata, *C. pluriannulata*, and *C. ulmi*) were found to respond to pyridoxine as such and its physiological activity was not replaced by *dl*-alanine. No evidence was obtained from these fungi for the existence of a more active form of pyridoxine, the pseudopyridoxine of Snell et al. (E. S. R., 88, p. 712).

The regulation of plant growth, F. W. Went (*Amer. Sci., 31 (1943), No. 3, pp. 189–210, illus. 3*).—This is an analytical review (27 references) of the present status of knowledge on the plant growth substances. It is pointed out that though these substances are evidently hormones for plants, they are vitamins for animals which have lost the capacity to synthesize them. This shows how closely vitamins and hormones are connected and indicates the essential unity between plants and animals. The thesis is developed and supported by experimental evidence that all parts of the plant are interrelated by the formation of certain chemicals, hormones, in one part, which regulate the growth of other parts. Since all these relations are quantitative, an amazing unity within the plant is realized, so that one part cannot develop too much at the expense of another. The specific activities of many of these hormones are discussed and practical applications suggested. In conclusion, it is stated that "the importance of basic knowledge for improvement in agriculture and horticulture is only slowly becoming realized outside academic circles. But with the accumulation of more basic data concerning the growth and development of plants a new science, plant engineering, is slowly emerging."

Further observations on the specificity of hypoxanthine for Phycomyces, W. J. Robbins (*Natl. Acad. Sci. Proc., 29 (1943), No. 7, pp. 201–202*).—Studies of the growth substance previously identified as hypoxanthine (E. S. R., 87, p. 645) in comparison with five purine and guanine compounds supported the idea that its action on *Phycomyces* has a considerable degree of specificity, guanine being the only other compound tested which approaches it in activity. An increasing number of observations on various organisms indicate that the purines probably function as growth substances, but there seems to be little uniformity since the specific purines which are active appear to vary from organism to organism.

Resistance of yeast to low temperatures, J. D. Campbell (*Biodynamica, 4 (1943), No. 83, pp. 65–70*).—Quantitative evidence is presented that low temperatures are definitely harmful to yeast (*Saccharomyces cerevisiae*) cells. A single freezing at liquid-air temperature, —50°, or —30° C., followed by immediate thawing, prevented 48–94 percent of the cells from multiplying. Repeated freezings at these temperatures caused greater injury than a single freezing. After five freezings complete sterilization was occasionally obtained. In general, the lower the temperature the greater was the injury. Yeast cells in the actively growing state were less resistant than physiologically inactive cells.

The resistance to low temperatures of a culture of Saccharomyces cerevisiae grown from a single cell, H. M. Baum (*Biodynamica, 4 (1943), No. 84, pp. 71–74*).—Freezing of 1- to 16-day-old cultures of this yeast at —50°, —30°, —20°, —15°, or —10° C. killed a considerable number of the cells, and five successive freezings killed many more cells than one. The lethal action of freezing on yeast, which decreases rather slowly when the temperatures vary from —190° to —30° according to Campbell's data (see preceding note), decreases very rapidly when the temperatures reach —15° and —10°. Single-cell cultures gave no more uniform results than supposedly less homogeneous cultures.

Some effects of soil and air temperatures on the growth of certain grass species, E. M. Brown. (U. S. D. A. and Mo. Expt. Sta.). (*Sci. Mo., 57 (1943), No. 3, pp. 283–285, illus. 3*).—Recognizing its importance in solving some problems of lawn and pasture management, the author investigated the relation of the growth of certain grasses (*Poa pratensis, Cynodon dactylon,* and *Dactylis glomerata*) to air and soil temperature in thermo-regulated growth chambers (illustrated), each consisting of a modified soil-temperature tank surmounted by a glass-enclosed compartment, the air chamber, the temperature of which was regulated independently of that of the soil temperature tank. In this preliminary report, the detailed reactions of these three species to soil and air temperatures are presented. A high soil temperature proved much more harmful to bluegrass and orchard grass than a high air temperature, and the Bermuda grass thrived at high soil and air temperatures severely injuring the other two.

A handbook of plant tissue culture, P. R. WHITE (*Lancaster, Pa.: Jaques Cattell Press, 1943, pp. 277+, illus. 71*).—This handbook was planned "as an aid to those who may actually make use of the technic—students, investigators in other fields for whom the methods presented may be useful in the solution of their own problems, and perhaps a very few who may approach the subject for its own sake." An introductory chapter emphasizes the importance of morphogenesis, out of the study of which the tissue culture method was evolved. Then follow a historical sketch of four periods of its development, with portraits of leading investigators; a discussion of the material which may be successfully used; detailed descriptions of the kind of laboratory needed, the nutrients used, and how cultures are started and kept going; and a consideration of growth measurements and their interpretation. The final two chapters call special attention to the important role which the method may play in solving biological problems. The bibliography contains 457 references, and an author-subject index is provided.

An installation of large sand-culture beds surmounted by individual air-conditioned greenhouses, M. D. THOMAS, R. H. HENDRICKS, J. O. IVIE, and G. R. HILL (*Plant Physiol., 18 (1943), No. 3, pp. 334–344, illus. 10*).—The installation described and illustrated has automatic equipment for subirrigating the beds and facilities for measuring transpiration, photosynthesis, and root respiration. The beds are surmounted by airtight individual greenhouses, supplied with washed and filtered air free from SO_2, thus permitting control of the gaseous environment.

Observações sobre a metodologia para o estudo da transpiração cuticular em plantas Brasileiras, especialmente em Cedrela fissilis [Observations on methods of studying cuticular transpiration in Brazilian plants, especially in C. fissilis], F. K. RAWITSCHER and M. G. FERRI (*São Paulo Univ., Faculd. Filosofia, Ciên. e Letras, Bol. 28, Botânica No. 3 (1942), pp. 113–137, illus. 6; Eng. abs., p. 136*).—This deals with the methods (14 references) that can be used to determine cuticular transpiration, the main difficulty here being to exclude water loss through the stomata. *C. fissilis* was the plant used in testing the various technics described and evaluated.

The physiology of incompatibility in plants.—II, Linum grandiflorum, D. LEWIS (*Ann. Bot. [London], n. ser., 7 (1943), No. 26, pp. 115–122, illus. 9*).—In continuation (E. S. R., 88, p. 313), the incompatibility of illegitimate matings in *L. grandiflorum* was found due to failure of the pollen grains to swell and germinate in pin × pin pollinations, and to bursting of the grains in thrum × thrum pollinations. Low temperature, causing a higher growth rate of incompatible tubes in other plants, had no effect in *Linum*. Compatible pollen-tube growth was normal, the rate increasing with rise in temperature. Thrum pollen grew about twice as fast as pin pollen, though there is no size difference. The twisting of the pin style after legitimate pollination and of the thrum style after all pollinations is due to water withdrawal by the pollen from the style.

Pin styles do not curl when illegitimately pollinated because the pollen does not extract water from the stigma. The osmotic pressure of the styles proved equivalent to 10–12 percent sucrose in the thrum and to 20 percent sucrose in the pin styles. The values for the pollen grains are thrum pollen 80 percent and pin pollen 50 percent sucrose. The ratio of the osmotic pressure of pollen to styles is 4:1 in both legitimate pollinations, 5:2 in pin × pin and 7:1 in thrum × thrum. This disparity partly determines the behavior of illegitimate pollen tubes. The inability of the pin pollen to extract water from the stigma cannot be explained entirely on unsuitable osmotic differences, and it is suggested that differences in protoplasmic colloids may control the imbibition of water in the early stages of pollen germination.

Studies on foliar hydration in the cotton plant, III, IV (*Ann. Bot. [London], n. ser., 7 (1943), No. 26, pp. 147–156, illus. 2; pp. 157–169, illus. 4*).

III. *Preliminary observations using the pruning method*, E. Phillis and T. G. Mason.—In a previous contribution (E. S. R., 88, p. 605), the disk-culture method was used. In the present study, it was found through partial defoliation of a plant supplied a full nutrient solution that pruning causes increases in the water, dry weight, and protein contents of the remaining leaves, but only small changes in depression of the freezing point and conductivity of the sap. Difficulties in interpreting the results of such experiments are pointed out. In a second experiment, plants grown in a full nutrient solution were partially defoliated and transferred to $CaCl_2$ solutions and subsequent changes in the remaining leaves noted. Under these conditions, water uptake by the leaves was proportional to the increase in $CaCl_2$ content. It is pointed out that the behavior of leaves on pruned plants supplied a full nutrient solution is similar to that of disks floated on a similar solution, and that leaves on a pruned plant supplied $CaCl_2$ solutions behave like disks floated on such solutions. From results to this point it is still uncertain whether the total amount of salt or its concentration in the sap is the more important factor controlling hydration.

IV. *The influence of composition and concentration of nutrient solution*, T. G Mason and E. Phillis.—In one experiment in which the nutrient was varied in both composition and concentration, water in the leaf was correlated with both dry weight and protein—used here as indicators of anhydrous protoplasm. When this "bulk factor" (weight of anhydrous protoplasm) was removed by expressing water in terms of dry weight and/or protein, hydration was significantly and positively correlated with sap conductivity. These results fully accord with the salt theory of foliar hydration, but no evidence of a specific effect of any single element on hydration was detected. In a second experiment the concentration of the nutrient solution was varied, and again hydration and sap conductivity were strongly correlated. Old leaves had higher conductivities and hydration than young leaves, and conductivity was more strongly correlated with hydration than was freezing-point depression of the expressed sap. Correlation between freezing-point depression and hydration was appreciably increased when the former was corrected for sugar concentration in the sap. In a third set-up a wide range of N supply was provided. Sap conductivity and hydration here were negatively correlated on the dry-weight basis and positively so on the protein basis. When the data for the three experiments are combined the correlation between hydration in terms of dry weight and sap conductivity is seen to be both positive and high. Over the wide range of nutrient supply used, it would appear that hydration is chiefly determined by the level of salt concentration.

Relation between age and dry weight of the corn plant (Zea mays L.), E. C. Miller (*Kansas Sta. Tech. Bul. 54 (1943), pp. 51, illus. 13*).—From Kansas

Sunflower corn grown in the field during four seasons (1924–27), five representative plants were collected at weekly intervals each season and their growth rates determined by the increase in dry weight of the aerial portion—divided into leaves, stems, ears, husks, and shank. At 8 weeks of age the dry weights of the leaves and of the stem were about equal. During the next 5 weeks the dry weight of the stems increased rapidly, much faster than the leaves. The ear reached its maximum dry weight at the end of the fourteenth week, as did the shank, whereas the husks attained this maximum at the close of the thirteenth week. The greatest percentage of gain in growth rate for 1 week over the preceding always occurred during the earlier developmental stages when the actual increase in dry weight was small. During the 4 yr. the increase or decrease in dry weight of leaves was determined 47 times, 8 of them showing a loss over the previous week, but in all but two cases these losses were so small as to disappear when averaged with the weekly results of the other years. The gain or loss in dry weight of the stems during the 4 yr. was determined 44 times, losses occurring in 5 cases but giving a negative value only once when averaged with the corresponding weeks of the other years. The ears exhibited no loss in weight in any of the 18 determinations made, but of the 17 determinations on husks one showed a loss which disappeared in the average. Only 1 of 17 determinations on the shank showed a decrease, but this one was within the limit of experimental error.

The dry weight of the leaves during the first week composed practically 100 percent of that of the plant. During the second week the stem began to contribute a larger portion and between the eighth and ninth week it and the leaves comprised an equal portion of the total dry weight. At the end of the experiments the average proportion of the total dry weight comprised by the leaves amounted to 20.5 percent; that of the stems about 34 percent. The ear at the close comprised about 32 percent of the dry weight, and the husks about 12 percent, whereas the shank never composed much over 3 percent of the total dry weight of the plant. The leaf surface was determined weekly during 1925–27 until it reached its maximum. The rate of transpiration was found for the 3 yr. 1924–26. During the yars 1925–26 the total amount of water transpired, the amount of aerial dry matter produced, and the water requirement of the aerial portion of the plant were determined.

Vegetative and floral growth of Fouquieria splendens, R. A. Darrow. (Univ. Ariz.). (*Ecology, 24 (1943), No. 3, pp. 310–322, illus. 6*).—The results are presented of a study of the vegetative increment and inflorescence development of the ocotillo, a long-lived desert shrub.

Boron as a plant nutrient: A bibliography of literature published and reviewed, January 1940 through December 1940 (with index), C. M. Schmidt and D. H. Jameson (*Washington, D. C.: Amer. Potash Inst., Inc., 1941, Sup. 3, pp. 68+*).—This is a supplement to bibliographies previously noted (E. S. R., 84, p. 22).

Effect of boron in the substrate on the rate of nitrate absorption and on nitrogen distribution in nasturtium, G. B. Briggs. (N. J. Expt. Stas.). (*Plant Physiol., 18 (1943), No. 3, pp. 415–432, illus. 1*).—As compared with normal plants, nasturtiums grown in nutrient solutions without B exhibited a progressive decrease in nitrate absorption with length of time of treatment, and there was no close correlation between the subsequent decrease in rate of nitrate absorption and the extent of root injury. Ammonium and carbohydrates as well as soluble organic N accumulated in plants with B-deficiency symptoms. It thus appears that in the absence of adequate B the amination of carbohydrate derivatives is inhibited. The proportion of total soluble to insoluble organic N was lower in the stems and roots of plants showing B toxicity symptoms than in control plants. This suggests an accelerated synthesis of complex nitrogenous compounds.

The utilization of sulphate and sulphur dioxide for the sulphur nutrition of alfalfa, M. D. Thomas, R. H. Hendricks, T. R. Collier, and G. R. Hill (*Plant Physiol., 18 (1943), No. 3, pp. 345–371, illus. 5*).—The results of experiments with alfalfa grown in large sand-culture equipment (technic described) over a 3-yr. period were as follows: With the lower sulfate concentrations (0.5 and 5 p. p. m.) employed, pH 5.5 was more favorable to growth than pH 7, and there was no pH effect with 90 p. p. m. sulfate S in the nutrient solution. Leaves of the S-deficient plants were definitely chlorotic, and their yield was appreciably lower but was improved by SO_2 fumigation. The yield of the fumigated plats supplied adequate amounts of sulfate was statistically the same as that of the unfumigated controls. The root systems of the plats did not vary as much in weight as did the crops. The net assimilation data from CO_2 exchange measurements confirmed the yield data. Transpiration values fell within a rather narrow range in each experiment, except that the low S plats gave appreciably lower results. There was no discernible effect due to fumigation in the plats supplied with adequate S. Transpiration per unit of top growth was particularly high in the S-deficient control plats. The SO_2 fumigations had no appreciable effect on transpiration in the plats adequately supplied with sulfate S. Summer crops transpired much more water than spring and fall crops. These relationships were not greatly changed when the transpiration values per unit of dry matter were corrected for water evaporated from the surface of the sand.

Analyses of the vegetation for S indicated that absorption of this element was increased by increasing the sulfate concentration of the nutrient solution or by SO_2 fumigation. Absorption was not influenced by the pH range considered. Nearly the same amount of S absorption occurred in comparable plats at the low and high nutrient levels, but owing to slower growth of the low nutrient plants the S concentrations in them were greater than in the high nutrient plants. The S balance sheet indicated that the plants received some S from a source other than the nutrient solution, the amount being least in the high-S plats. The fumigated plants absorbed less S from the nutrient solution than did the controls. With less than 1 p. p. m. sulfate S in the nutrient solution there was definite evidence of S deficiency in the plants. Taking the "unaccounted for" S into consideration, it appeared that under the experimental conditions deficiency symptoms could be expected with less than about 1.5–2 p. p. m. sulfate S, if the nutrient solution were the only S source.

Protein synthesis in plants, A. H. K. Petrie (*Biol. Rev. Cambridge Phil. Soc., 18 (1943), No. 3, pp. 105–118*).—The final stages in protein (rather than amino acid) formation are discussed through the physiological approach. After reviewing (a page and a half of references) the present status of knowledge of protein structure, various suggestions as to the substances used in its formation are considered. The evidence is believed to favor the formation by condensation of amino acids rather than by polymerization of some simple unit. This leads to a consideration of the various seats of synthesis in the cell and to the mechanism of protein formation from its constituent parts. Finally a discussion is given of the interrelation of nitrogen metabolism and respiration and of the factors governing amino-acid formation and protein synthesis.

The distinction between ribose- and desoxyribose-nucleoproteins and its cytological implications, J. Dufrenoy. (La. State Univ.). (*Biodynamica, 4 (1943), No. 87, pp. 131–152*).—Correlating the results of several modern cytochemical technics, the author arrives at the following concepts: Some of the intracellular interphases recognized as sites of metabolic activity are the boundaries of permanent self-propagating cytochemical units, such as the chromosomes, chromocenters, chromatic reticulum, and chondriosomes. The permanent units in the nucleus are made up largely of polymers of desoxyribose nucleic acids (Feulgen-positive); in the cytoplasm, of ribose nucleotides (Feulgen-negative). The chromosomes appear as consisting of bands of desoxyribose nucleic acids (euchromatin) and of capsulated masses of ribose and desoxyribose nucleic acids (heterochromatin) attached to longitudinal threads of protamine, the whole being enclosed in a histone coat. Exchange of material between nucleus and cytoplasm is understood to consist in the diffusion of substances synthesized in the nucleus. Histone and ribose nucleotides would thus diffuse from the nucleus to cytoplasmic interphases, whereas desoxyribose nucleotides would polymerize in situ into the fibrous proteins of the chromosomes. In yeasts and bacteria particles of desoxyribose nucleic acids and of ribose nucleic acids can be demonstrated. This distinction offers some indication as to which cell constituents in these organisms are the homologues of chromosomes and of cytoplasmic inclusions in the higher plants and animals. The ribose nucleotide constituents of plant viruses are derived from the ribose nucleotides of chondriosomes (plasts). Tumor growth appears to result from a disequilibrium in the proportion of nucleic acids to the other cell constituents. There are 64 references.

Phosphorus metabolism in moulds, T. Mann (*Nature [London], 151 (1943), No. 3839, pp. 619–620, illus. 1*).—A note on the synthesis of polyphosphate by a strain of *Aspergillus niger* grown under aerobic conditions at 30° C. on a medium composed of 10 percent glucose, 0.2 percent K_2HPO_4, 0.5 percent $NaNO_3$, and 0.1 percent $MgSO_4.H_2O$.

Reversal by phosphatides of the antimicrobial action of a crystalline protein from wheat, D. W. Woolley and L. O. Krampitz (*Jour. Biol. Chem., 146 (1942), No. 1, pp. 273–274; also in Rockefeller Inst. Med. Res. Studies, 123 (1943), pp. 131–132*).—A preliminary report.

Amylases and carbohydrates in developing maize endosperm, L. Bernstein. (Cornell Univ.). (*Amer. Jour. Bot., 30 (1943), No. 7, pp. 517–526, illus. 4*).—Beta-amylase activity was present to a small degree in developing endosperms, but alpha-amylase activity was absent. Beta-amylase activity showed a high positive correlation with sucrose; though not statistically significant, it was inversely related to the rate of starch formation. The rate of starch formation was highly correlated with sucrose but not signficantly with reducing sugar. The results of carbohydrate analyses of developing endosperms of dent, waxy, sugary, flint, and floury types in general agreed with the findings of earlier workers. The xenia effect on the rate of starch formation suggested an explanation for contradictory published statements as to the relative weights of inbred and hybrid kernels. Microscopic examination of cross-sections of the endosperm at various developmental stages revealed that starch accumulation occurs first in the abgerminal and distal cells. It is initiated progressively later in those cells which are more basally disposed and last in the cells next to the scutellum. On the basis of the low beta-amylase activity it is suggested that there is a similar progression of cells containing active beta-amylase. The findings are compared to related studies by others (30 references).

Effect of post-harvest pre-storage conditions on the rate of development of sugar in potato tubers during subsequent cold storage, F. E. Denny and N. C. Thornton (*Contrib. Boyce Thompson Inst., 13 (1943), No. 2, pp. 65–71*).—Soon after harvest (August 27), tubers of four varieties were placed under high temperature (23.3°–24.4° C.) and low humidity (42 percent), the same temperature with high humidity (92 percent), medium temperature (19.8°) and

70 percent humidity, and low temperature (15°) and 86 percent humidity. On October 1 and 26 and December 1 and 24, samples of tubers from these four prestorage conditions were removed and placed in cold storage at 5°, and at intervals of 15, 29, and 60 days thereafter samples were analyzed for sugar. Tubers prestored at 15° developed only about half as much sucrose as for the three other pretreatments, and the level of reducing sugar formed during cold storage was apparently lowered by about 20 percent. The post-harvest prestorage conditions did not influence the sugar content during the prestorage period, but only after the tubers had been transferred to the 5° temperature.

The effect of low concentrations of carbon dioxide upon the sugar content of potato tubers in cold storage, F. E. Denny and N. C. Thornton (*Contrib. Boyce Thompson Inst., 13 (1943), No. 2, pp. 73–78*).—The effect of adding small amounts of CO_2 to the atmosphere surrounding potato tubers stored at 5° C. was to retard the development of reducing sugar and increase that of sucrose. Over a 45-day period the increase in reducing sugar in presence of 4.9 percent CO_2 was only about a third as much as that of the control without CO_2 and about two-fifths as much with a CO_2 concentration of 2.49 percent. The lowest concentration tried, 1.1 percent, had a definite effect, retarding the rate of increase of reducing sugar by about 20 percent and increasing the sucrose gain by about 30 percent during storage intervals of 30–40 days.

Flash saturation and reaction periods in photosynthesis, F. F. Rieke and H. Gaffron (*Jour. Phys. Chem., 47 (1943), No. 4, pp. 299–308, illus. 5*).—Using a method rendering it possible to change the intervals between flashes without varying the average intensity, simply by making the intervals of unequal length, it was proved that the reaction responsible for flash saturation is not sensitive to cyanide. The apparent cyanide effect on photosynthesis in flashing light as commonly used is due to the fact that another reaction, not directly connected with the photochemical process as such, now becomes limiting. This reaction is thought to concern the initial fixation of CO_2. It was possible to obtain saturation in continuous light with the alga *Scenedesmus* when the reduction of CO_2 proceeded with the absorption of H, because at higher intensities photoreduction turns back to normal photosynthesis. With light flashes spaced far enough apart, no such reversion took place, and under these conditions a flash saturation was observed which attained approximately the same value as the aerobic flash saturation. By varying the interval between the flashes producing flash saturation in photoreduction it was found that the length of the dark interval between flashes necessary to maintain flash saturation is the same as that observed with normal photosynthesis. This study is believed to support the view that the truly photochemical processes remain unchanged whether CO_2 is reduced with evolution of O_2 or with absorption of H_2.

Effect of depth of immersion on apparent photosynthesis in submersed vascular aquatics, B. S. Meyer, F. H. Bell, L. C. Thompson, and E. I. Clay. (Ohio State Univ.). (*Ecology, 24 (1943), No. 3, pp. 393–399*).—At depths ranging to 10 m. in Lake Erie, the rate of apparent photosynthesis in all five species (*Potamogeton richardsonii, Najas flexilis, Anacharis canadensis, Vallisneria americana,* and *Heteranthera dubia*) decreased less rapidly with depth of immersion than did the light intensity. In all except *N. flexilis*, for which the value was slightly higher, the compensation point was less than 2 percent of the sunlight intensity on clear summer days. The results indicated that *V. americana* can survive at lower light intensities than the other plants studied.

Effects of solvent upon absorption spectra of chlorophylls A and B; their ultraviolet absorption spectra in ether solution, D. G. Harris and F. P. Zscheile. (Ind. Expt. Sta.). (*Bot. Gaz., 104 (1943), No. 4, pp. 515–527, illus.*

4).—Chlorophyll *a* solutions were prepared in 13 and chlorophyll *b* solutions in 5 solvents by direct elution from sucrose adsorption columns, and absorption spectra for each solvent measured spectrophotoelectrically in the visible region. Spectra for the ultraviolet region to 2,630 a. u. were determined for solutions in ethyl ether. A preparation of dried chlorophyll *a* retained excellent spectroscopic properties. The application of Kundt's rule to chlorophyll solutions is discussed, as well as certain relations of spectroscopic properties and solvents to analytical applications.

Chlorophyll fluorescence and energy transfer in the diatom Nitzschia closterium, H. J. Dutton, W. M. Manning, and B. M. Duggar. (Univ. Wis.). (*Jour. Phys. Chem., 47 (1943), No. 4, pp. 308–313*).—The quantum yield of chlorophylll fluorescence in *N. closterium* was found constant within rather large limits of experimental error for exciting wavelengths 6,000, 5,780, 4,700, or 4,358 a. u. Light absorbed by yellow pigments in this marine diatom can therefore reappear as chlorophyll fluorescence. This leads to the conclusion that the previously observed carotenoid-sensitized photosynthesis in *Nitzschia* occurs principally through the transfer of absorbed energy from carotenoid to chlorophyll molecules with subsequent reactions the same as though chlorophyll molecules were the primary absorbers. In acetone extracts of the diatom, light absorbed by the yellow pigments did not contribute appreciably to chlorophyll fluorescence, indicating that little or no energy was transferred between pigments in acetone solution.

Radiant energy nomenclature, R. B. Withrow. (Ind. Expt. Sta.). (*Plant Physiol., 18 (1943), No. 3, pp. 476–487*).—This report is presented in an endeavor to promote among plant physiologists a more consistent and uniform usage of the nomenclature of radiant energy. Included are radiometric and photometric terms, transmission and related terms, and miscellaneous terms.

Influence of temperature on photoperiodic reactions in leaf blades of Biloxi soybean, M. W. Parker and H. A. Borthwick. (U. S. D. A.). (*Bot. Gaz., 104 (1943), No. 4, pp. 612–619, illus. 1*).—Through use of an apparatus devised to control the temperature of individual leaves of Biloxi soybeans during dark periods of photoperiodic treatment while the rest of the plants received greenhouse temperatures and long photoperiods, it was found that when a leaf was held at 50° F. or lower during a 5-day induction period, floral initiation was greatly inhibited. Between 70° and 90°, such initiation was in general equal to that of the controls held at greenhouse temperatures, but at 90° or higher the extent of the initiation again was less. On the basis of data presented here and in two preceding papers (E. S. R., 82, p. 160; 86, p. 168), the inhibiting effect of low temperature on floral initiation in Biloxi soybeans apparently results from its effect on the photoperiodic reactions in the leaf blade during the dark period, rather than through its effect on translocation of a flower-inducing stimulus from the leaf to the terminal meristems or its effect at the terminal meristems on the differentiation and development of flower buds.

Differential sensitivity of prophase pollen tube chromosomes to X-rays and ultraviolet radiation, C. P. Swanson. (Mich. Expt. Sta.). (*Jour. Gen. Physiol., 26 (1943), No. 5, pp. 485–494, illus. 6*).—Using *Tradescantia paludosa* as test plant and the pollen tube technic, it was found possible to study the sensitivity of prophase stages to X-ray and ultraviolet irradiations and to correlate the varying sensitivity with changes in the generative nucleus. Sensitivity to ultraviolet decreased from the 2-hr. stage until at 11 hr. after germination there was no further production of chromosome breaks. Sensitivity to X-rays rose to a peak at the 4-hr. stage, but then subsided until no breaks were realized after the 10-hr. stage. In this latter respect the effects of

X-rays and ultraviolet were similar. Each type of X-ray break showed its own individual trend. Correlation of X-ray breaks with changes in the generative nucleus indicated that the important events determining the sensitivity of the chromosomes to breakage are the uptake of water at the time of germination and the movement involved in spiralization. The changing sensitivity to ultraviolet may depend on any one or all of three factors, viz, the nucleic acid cycle, changes in the matrix, and the number of subdivisions in the chromosome. These factors are discussed.

The X-ray induced mutation rate in pollen in relation to dosage and the nuclear cycle, C. M. Rick. (Univ. Calif.). (*Genetics, 28 (1943), No. 3, pp. 237–252, illus. 5*).—X-rays were applied to *Tradescantia* plants in such a way that inflorescences received doses of 62.5, 125, 250, and 500 r. (roentgens). The daily fluctuations of percentage of pollen abortion, mean pollen length, and variance of length were observed over a 2-mo. period after treatments. When microspores were treated during the period from meiosis to the first mitosis, pollen abortion subsequently rose to a significantly higher level than in controls; mean lengths decreased and variance of length increased significantly. These previously demonstrated mutational responses increased with increasing X-ray dosages, and the response of pollen abortion was approximately linear whereas that of variance of length was intermediate beween a linear and a squared relationship. The changes in length induced by treatment were mostly in the negative direction. Comparisons of curves yielded a crude estimate of 100 size changes or mutations per 100 grains per 200 r., greatly exceeding the amount of gross chromosomal aberration (about 40 per 100 cells) induced with the same dosage and material. The linear response to dosage in pollen abortion and the nature of the induced size changes bore a close resemblance to X-ray effects in other organisms which have been proved to result from mutation. This similarity is considered further evidence that the pollen changes were the phenotypic expression of mutations induced by the X-ray treatment. A rise to almost complete pollen abortion occurred after X-rays had been administered during meiosis and the preceding period of development. A secondary peak of lower level was found to correspond to the first gametophytic mitosis. According to the data presented, these rises in sterility were not strictly of the gene mutational type but were more related to chromosomal aberration. The same measurements were made after subsidence of meiotic sterility, about 50 days after treatment. The very irregular return to a nearly normal level of pollen abortion rendered these measurements uncertain. Nevertheless, the mutational responses also seemed to occur when the X-rays were thus applied during the premeiotic period.

Effect of colchicine pretreatment on the frequency of chromosomal aberrations induced by X-ray radiation, R. T. Brumfield (*Natl. Acad. Sci. Proc., 29 (1943), No. 6, pp. 190–193*).—Treatment of onion roots for 45 min with a 0.05 percent colchicine solution prior to X-irradiation resulted in less than one-third as many chromatid aberrations as in colchicine-untreated controls. The frequency of X-ray-induced chromosome effects was about the same in pretreated roots and controls. Colchicine pretreatment is believed to reduce the amount of chromosome movement in prophase where chromatid effects are induced, thus resulting in less opportunity for fusion of broken ends into new combinations.

Chemical reactivity of cotton fiber as related to type of X-ray diffraction pattern, R. E. Reeves and W. A. Sisson (*Contrib. Boyce Thompson Inst., 13 (1943), No. 1, pp. 11–15, illus. 1*).—From a study of the reactivity of cotton fibers with ethereal diazomethane it was found that the extent of methylation is lowest for native, intermediate for partially mercerized, and highest for fully mercerized fibers. In these experiments change in reactivity paralleled change in type of X-ray diffraction pattern obtained from the fibers.

Protecting cotton fiber from periodate oxidation, R. E. Reeves (*Contrib. Boyce Thompson Inst., 13 (1943), No. 1, pp. 1–9, illus. 2*).—Raw or alcohol-benzene extracted cotton fiber reacts with a measurable amount of periodic acid before loss of viscosity is noted. Mercerized or water-extracted fiber suffered a viscosity loss with the smallest amounts of reagent tested. Methylation of native fiber to the extent of 9.8 percent or mercerized fiber to 19.1 percent resulted in much higher resistance to oxidation by periodic acid. Methylated fiber resistant to such oxidation failed to exhibit increased resistance to sodium hypochlorite.

Swelling-staining reagent for studying fiber structure, W. M. Harlow (*Paper Trade Jour., 116 (1943), No. 15, p. 52, illus. 1*).—Excellent results are reported from use of ruthenium red dissolved in trimethylbenzylammonium hydroxide.

Colchicine-Feulgen leaf smears, J. R. Meyer (*Stain Technol., 18 (1943), No. 2, pp. 53–56, illus. 1*).—This technic is said to prevent spindle formation, allow chromosomes to be widely spread in the cell, straighten the chromatids, allow constrictions to become very noticeable, increase the number of chromosome plates, facilitate smearing, and stain chromosomes only. Furthermore, young leaves are generally easily obtainable, whereas roots of the proper sort are to be had only under special conditions; and mitoses are often more numerous in young leaves than in roots. The detailed schedule for specimens of *Phlox* is presented.

On the staining of yeast spores, L. S. McClung (*Science, 98 (1943), No. 2537, pp. 159–160*).—A malachite green technic proving satisfactory is outlined.

Differentiating abnormal cells in Valencia orange vesicles, F. M. Turrell and E. T. Bartholomew. (Calif. Citrus Expt. Sta.). (*Stain Technol., 18 (1943), No. 2, pp. 73–75, illus. 2*).—Metamorphosing cells developing thick cell walls in the juice vesicles of granulated Valencia oranges, undetectable by ordinary microscope examination, were differentiated at an early stage for microchemical analysis in lignification studies by treating thick sections of the vesicles overnight in a 1:10,000 aqueous solution of ruthenium red, followed by 5–10 min. in a 1:5,000 aqueous solution of methylene blue, and then differentiating in water.

Vessel specialization in the late metaxylem of the various organs in the Monocotyledoneae, V. I. Cheadle. (R. I. State Col.). (*Amer. Jour. Bot., 30 (1943), No. 7, pp. 484–490, illus. 8*).—Material from 306 species in 34 families was used to demonstrate the specialization of vessels from organ to organ within members of this plant group. Among the groups considered, the grasses, though highly specialized in general with regard to their vessels, can still be used to illustrate the trends of specialization in vessels from the root to the leaf.

Ontogeny of the vascular bundle in Zea mays, K. Esau (*Hilgardia [California Sta.], 15 (1943), No. 3, pp. 325–368, illus. 14*).—As representative of the monocotyledons, the results of a study of the morphology and ontogeny of the vascular bundle in corn are presented and illustrated in detail.

Vascular differentiation in the pear root, K. Esau (*Hilgardia [California Sta.], 15 (1943), No. 3, pp. 299–324, illus. 11*).—Detailed results are presented and illustrated relative to the primary organization of the vascular cylinder and secondary growth in the root of *Pyrus communis*.

GENETICS

[Crop plant genetics] (*Genetics, 28 (1943), No. 1, pp. 69, 72–73, 78, 80, 81–82, 83–84, 89–90, 90–91*).—Papers presented at the 1942 meetings of the Genetics Society of America at New York City, N. Y. (and abstracted in the above paging), included Inheritance of a Cyanogenetic Glucoside and Its Hydrolyzing Enzyme in White Clover, by S. S. Atwood and J. T. Sullivan (p. 69), The Effects of Inbreeding Upon Meiotic Irregularity in Plants of *Dactylis glomerata*, by W. M. Myers (pp. 83–84), and Effects of Different Proportions of Specific Chromosomal Complements on Size in *Nicotiana*, by H. H. Smith (pp. 89–90) (all U. S. D. A.); Varietal Differences and Inheritance of Vitamins C and A in Potatoes, by W. F. Dove, E. F. Murphy, and R. V. Akeley (pp. 72–73) (Maine Expt. Sta. and U. S. D. A.); Growth Changes Associated with Chromosome Aberrations, by D. F. Jones (p. 78) (Conn. [New Haven] Sta.): Inheritance of Hard-Seed Production in Common Beans (*Phaseolus vulgaris*), by G. A. Lebedeff (p. 80) (P. R. Univ. Sta.); Experimental Data on the Problem of Dominance in Quantitative Character Inheritance in Maize and Tomatoes, by E. W. Lindstrom (pp. 81–82) (Iowa State Col.); Gene Variability in Maize.—I, Some Alleles of *R.* (R^r Series), by L. J. Stadler and S. Fogel (pp. 90–91) (U. S. D. A. and Univ. Mo.); and The Genetic Nature of X-Ray and Ultraviolet Induced Mutations Affecting the Gene *A* in Maize, by L. J. Stadler and H. Roman (p. 91) (U. S. D. A., Univ. Mo., et al.).

Spragg memorial lectures on plant breeding (third series) (*East Lansing: Mich. State Col., 1942, pp. 38, illus. 1*).—Additional lectures in this series (E. S. R., 81, p. 25) include Some Observations on Gene Variability and Spontaneous Mutation, by L. J. Stadler (pp. 3–15) (U. S. D. A. and Mo. Expt. Sta.); Fundamentals of Experimentation, by C. H. Goulden (pp. 16–27); and Controlled Heterosis as a Method of Forage Crop Improvement, by H. M. Tysdal (pp. 28–38) (U. S. D. A.).

The inheritance of a mutant character in Puccinia graminis tritici, T. Johnson and M. Newton (*Canad. Jour. Res., 21 (1943), No. 7, Sect. C, pp. 205–210, illus. 7*).—A culture of race 21 of the wheat stem rust fungus was found to produce on barberry about 50 percent white haploid pustules developing few or no pycnia and rarely aecia but occasionally giving rise to uredia and telia. By selfing studies and crosses with another physiological race, it was shown that diploidization of the mycelia of normal pustules by pycniospores from white pustules initiated physiologic races that produced white and normal pustules on barberry in approximately equal numbers, whereas normal to normal matings produced normal rust and white to white matings were sterile. The uredia occasionally arising in white pustules as a result of diploidization by either pycniospores or mycelia of normal pustules gave rise to physiologic races producing white and normal pustules in about equal numbers. The capacity to develop white pustules was not confined to any one sex or limited to any particular physiologic race. It is assumed that a mutation affecting one of the conjugate nuclei had taken place in the original culture of race 21, and that during meiotic divisions in the germinating teliospore the mutant factor had segregated so that half of the sporidia gave rise to white and half to normal pustules.

Inheritance and physiology of efficiency in iron utilization in soybeans, M. G. Weiss. (Iowa Expt. Sta. and U. S. D. A.). (*Genetics, 28 (1943), No. 3, pp. 253–268, illus. 4*).—Soybean varieties first tested on calcareous soils since their introduction from Manchuria differed markedly in chlorosis, and such differential performance could be induced on media low in concentration of available Fe. Differences between efficient (normal green growth) and inefficient (severe chlorosis) genotypes on such media were large enough to enable classification and study of inheritance of efficiency differences. Differences in Fe use efficiency appeared due to a single gene *fe*, with complete dominance of the *Fe* allele and absence of maternal inheritance. Composition in aerial plant tissues, as conditioned by *fe*, consisted of relatively higher pH, lower soluble Fe, higher total Fe, and lower K content.

Chromosomes of Astragalus, H. Vilkomerson (*Bul. Torrey Bot. Club, 70 (1943), No. 4, pp. 430–435, illus. 1*).—Some species of *Astragalus* absorb selenium from seleniferous soils; other closely related species do not. In this study of the chromosome numbers of 26 species, it was found that the 11 with 24 and the 1 with 44 chromosomes were all selenium absorbers, whereas of the 13 species with 22 chromosomes only 4 possessed this capacity. Possible phylogenetic relations are discussed, and polysomaty is reported for 3 species.

Chromosome numbers in the subfamily Aurantioideae, with special reference to the genus Citrus, C. A. Krug. (Calif. Citrus Expt. Sta.). (*Bot. Gaz., 104 (1943), No. 4, pp. 602–611, illus. 11*).—Chromosome numbers determined for 14 species belonging to 5 genera of the subfamily Aurantioideae showed the basic number $n=9$ to prevail. The similarity of the chromosome complements in the genera *Citrus*, *Fortunella*, and *Poncirus* suggested that these 3 may perhaps be considered merely species of a single genus.

Chromosome number and phylogenetic relationships in the Euphorbiaceae, B. A. Perry (*Amer. Jour. Bot., 30 (1943), No. 7, pp. 527–543, illus. 91*).—A preliminary survey (88 references) of the chromosome number and phylogenetic relationships in the spurge family is presented, along with a technic developed for obtaining somatic chromosome numbers in many species by smearing young leaf and stem-tip material. The relation of polyploidy to speciation and evolution is discussed. Consideration is given to the relation of numbers of chromosomes to life duration and of their morphology and basic numbers to taxonomic position. The data on distribution, temperature, and polyploidy failed to support the concepts that polyploids have wider or more northern distributions than diploids.

The behavior of meiotic prophase chromosomes as revealed through the use of high temperatures, C. P. Swanson. (Mich. Expt. Sta.). (*Amer. Jour Bot., 30 (1943), No. 6, pp. 422–428, illus. 13*).—Tetraploid species of *Tradescantia* exhibited an upset of the chromosome-spindle synchronization when buds were subjected to temperatures of 42.5°–44° C. and at the same time revealed the entire prophase development, thus providing a means of studying the coiling cycle. The results are discussed in detail.

Electrical correlates of pure and hybrid strains of sweet corn, H. S. Burr. (*Natl. Acad. Sci. Proc., 29 (1943), No. 6, pp. 163–166*).—The patterns assumed by living organisms form the basis of description and classification, but very little evidence has been put forth on the forces which impose these stable and characteristic patterns "on the dynamic flux which is unique in living systems." Many of the properties of the pattern have been related to structural elements in the chromosomes, including even molecular linkages. But the mechanism by which genes control form is still hidden; it is at this point that what is deemed the key problem, the pattern of organization, arises. As a result of the work here briefly reported the conclusion is thought inescapable that there is a very close relationship between the genetic constitution and the electrical pattern, for electrical correlates were found between different inbred strains of sweet corn even when the difference was due only to a single gene. The magnitude of the potential difference was positively correlated with the degree of hybrid vigor.

The variability of certain quantitative characters of a double cross hybrid in corn as related to the method of combining the four inbreds, E. L. Pinnell. (Minn. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 6, pp. 508–514*).—A study of plant-to-plant variability in the three possible double crosses from four inbred lines unrelated and differing widely in several quantitative characters suggested that the relative variability of the double crosses may not be predicted on the basis of the character means of either inbreds or single crosses.

Raspberry and blackberry breeding: Production of tetraploid raspberries, H. E. Fischer, G. M. Darrow, and F. Perlmutter. (U. S. D. A.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 447–456, illus. 4*).—As a result of colchicine treatments of seedlings, full tetraploidy as well as sectorial and periclinal chromosomal chimeras were induced in various hybrid populations of the raspberry. The tetraploid forms were distinguished by increased leaf size and thickness and by increased size of the calyx. When these observations were supplemented by pollen and seed measurements, most of the tetraploids could have been segregated without chromosome counts. The doubling of the chromosomes in the interspecific hybrid Taylor (*Rubus idaeus* × *R. strigosus*) × *R. parvifolius* did not result in a measurable increase in fertility. Although untreated progenies of this cross do not generally give fertile seedlings, some fertile plants were found. Apparently the chromosomes of the two parents are sufficiently homologous to result in good pairing occasionally. The seed size of the tetraploids was larger than in the diploids, but not greater than that found in many important commercial varieties of blackberry.

An F_2 colchicine-induced tetraploid cabbage and some comparisons with its diploid progenitor, E. H. Newcomer. (Univ. N. C.). (*Jour. Elisha Mitchell Sci. Soc., 59 (1943), No. 1, pp. 69–72, illus. 22*).—The treatment of the apical buds of cabbage seedlings, variety Ferry Hollander, with a 0.2 percent solution of colchicine resulted in the development of a tetraploid form of cabbage which was larger in every morphological comparison, except the chloroplasts, than the parent form. With the exception of primary multivalent pairing, chromosome functioning was normal, producing gametes of about 70 percent of complete fertility. The tetraploid contained from 25 to 50 percent more reducing sugars, total sugars, acid hydrolyzable substances, residual nitrogen, and vitamin C than did the parent diploid. The lower leaves of the tetraploid contained four times as much vitamin C as the corresponding leaves of the diploid.

Haploid-diploid twin embryos in Lilium and Nicotiana, D. C. Cooper. (Wis. Expt. Sta.). (*Amer. Jour. Bot., 30 (1943), No. 6, pp. 408–413, illus. 19*).—A synergid has been stimulated to divide in about 1 percent of the ovules of seven species of lily examined. Twin embryos, one haploid and one diploid, are thus produced; both may continue to develop, but usually the haploid embryo disintegrates at an early stage of development. Computations of the volume of diploid and haploid interphase nuclei showed about a 2 : 1 relationship. Twin embryos, one apparently arising from the zygote and the other from a synergid, were found in a young seed following the cross *N glutinosa* × *N. tabacum*. The relative size of the nuclei indicated that one was triploid and the other haploid. A suggestion is that embryos arising from synergids may account for many of the haploid plants discovered.

The dual phenomenon and sex in Hypomyces solani f. cucurbitae, H. N. Hansen and W. C. Snyder. (Univ. Calif.). (*Amer. Jour. Bot., 30 (1943), No. 6, pp. 419–422, illus. 3*).—The "dual phenomenon," where an individual thallus is composed of two types, *C* (conidial) and *M* (mycelial), has been demonstrated in many imperfect fungi in nature and observed to arise de novo in culture by change of *C* to *M*, but the reverse change has not been reported (E. S. R., 80, p. 22). Further data on the nature of the *C* to *M* change was obtained by progeny analyses of crosses between haploid thalli of the hermaphroditic heterothallic *H. solani* f. *cucurbitae*, from the results of which it appeared that the factors for *M* and *C* are allelomorphs and are inherited independently of the compatibility groups *A* and *a*. By backcrossing, it was found that *M* could function only as a male. It is concluded that the change from *C* to *M* is a true mutation, that it is a mutation from the hermaphrodite to the unisexual male, and that sex and compatibility are distinct and independent characters.

Occurrence of aneuploids in Lilium, R. N. STEWART. (Md. Expt. Sta.). (*Bot. Gaz., 104 (1943), No. 4, pp. 620–626, illus. 28*).—Counts of 25 and 26 chromosomes were made in plants of various species of *Lilium*, including *L. pumilum*, *L. tsingtauense*, *L. japonicum*, and *L. canadense*. The morphology of the extra chromosomes was in all cases different from that of the normal 24 chromosomes, and in meiosis they never paired with the normal complement. At least one of the extra chromosomes contained some active genic material.

Chromosomal interchange among six species of Datura in nature, A. D. BERGNER. (U. S. D. A.). (*Amer. Jour. Bot., 30 (1943), No. 6, pp. 431–440, illus. 2*).—This paper is concerned with segmental interchange as it has taken place within this genus in nature and is limited to those six species which can be crossed inter se, either directly or indirectly, so that the interchanged chromosomes can be identified and represented numerically in terms of prime type 1 of *D. stramonium*.

Cyto-genetic consequences of X-ray treatment of pollen in petunia, C. M. RICK. (Univ. Calif.). (*Bot. Gaz., 104 (1943), No. 4, pp. 528–540, illus. 15*).—When pollen of diploid petunia was subjected to X-ray doses of 10,000–100,000 r. (roentgens) and then applied to stigmas of untreated plants, that exposed to doses as high as 50,000 r. functioned to produce viable seed. The half-kill dose for the number of plants produced per flowers pollinated was about 9,000 r. No evidence was found of reduced pseudogamy or of pseudogamous development of diploid individuals from eggs in which a doubling of the chromosome number had occurred. Gross chromosomal deviations were observed in 33 plants produced by X-rayed pollen, including inversion, translocation, duplication, and deficiency, and one-third were chimeras. Two monosomics were also obtained. The results are discussed in detail.

Variations in the occurrence of bloat in the steer progeny of beef bulls, B. KNAPP, JR., A. L. BAKER, and R. W. PHILLIPS. (U. S. D. A.). (*Jour. Anim. Sci., 2 (1943), No. 3, pp. 221–225*).—A significant difference in the proportion of steers sired by 13 purebred Hereford bulls in 2 successive years was shown in the occurrence of excessive bloat. These results were based also on an analysis of the number of steer days during which bloat occurred. Evidently the progeny of different bulls showed wide differences in their ability to handle large quantities of feed without digestive disturbances in individual feeding records of performance tests. There were produced totals of about 8 progeny of 5 bulls in 1940–41 and 10 bulls in 1941–42.

Artificial insemination of dairy cattle, C. E. KNOOP and W. D. POUNDEN (*Ohio Sta. Bul. 641 (1943), pp. 16+, illus. 7*).—The construction of a dummy cow for the collection of semen and its examination and storage are described, including artificial insemination methods.

The physiological and pathological significance of the duration of gestation in the mare, J. W. BRITON and C. E. HOWELL. (Univ. Calif.). (*Jour. Amer. Vet. Med. Assoc., 102 (1943), No. 795, pp. 427–432*).—Comparison of the breeding records of 36 Arabian, 43 grade Belgian and Shire, 10 Percheron, and 5 Thoroughbred mares, covering 407 breeding years, showed that the nitrogen intake during the first half of the gestation period and genital diseases were the two most significant factors influencing the length of the gestation period.

Induction of estrus and ovulation in ewes during their anestrus season, A. H. Frank and A. Appleby. (U. S. D. A.). (*Jour. Anim. Sci., 2 (1943), No. 3, pp. 251–258, illus. 1*).—Oestrus occurred within 96 hr. and after 24 hr. in some cases, following the subcutaneous injection of oil with 2 mg. of stilboestrol and 1 mg. on the second day. The duration of oestrus lasted from 2 to 3 days. Six ewes were subsequently bred and one became pregnant when two doses of pregnant mare serum were given 16 days apart. Stilboestrol had an inhibitory effect on the action of gonadin, since in 7 of 15 cases ovulation did not occur when the substances were injected in combination. Thus stilboestrol either alone or in combination with pregnant mare serum did not induce the normal stimulation for oestrus, or at least it failed to cause successful fecundation in anoestrus ewes. There were employed in the study 50 ewes and 11 rams, first for the injection of serum and later of pregnant mare serum (gonadin).

Response of hypophysectomized immature male rats to pregnant mare serum, J. H. Leathem. (Rutgers Univ.). (*Soc. Expt. Biol. and Med. Proc., 53 (1943), No. 2, pp. 209–210*).—In hypophysectomized immature male rats pregnant mare serum maintained testes weight and stimulated seminal vesicle growth after 5 days. The hormone was administered to 6 groups of 7 to 13 rats at doses ranging up to 100 rat units. In general, the effect was increased with the larger doses.

Inactivation of estrone in normal male rabbits, G. R. Biskind and M. A. Meyer (*Soc. Expt. Biol. and Med. Proc., 53 (1943), No. 2, pp. 91–94*).—When two pellets of oestrone were subcutaneously implanted in three male rabbits the average weight of the testes was reduced to less than 0.5 gm. after 91 days. When the oestrone pellets were implanted in the spleen of normal individuals the testes weighed from 2 to 3 gm. Thus the liver inactivates the inhibitory effects of oestrone on the growth of the testes.

Lactation activity, chemical composition, and in vitro metabolism of rat mammary tissue, M. Kleiber, A. H. Smith, and P. Levy. (Univ. Calif.). (*Soc. Expt. Biol. and Med. Proc., 53 (1943), No. 2, pp. 94–96*).—Lactation did not affect the oxygen consumption of fresh mammary gland tissue in vitro, but oxygen consumption per milligram of dry tissue was increased. The oxygen consumption per unit of nitrogen in the tissue was decreased. These results were based on glandular tissue removed from pregnant rats before parturition and at 21 days of lactation. Litters of different sizes in utero or suckling showed a positive correlation between the intensity of lactation and the metabolic rate of the mammary gland in vitro.

Lactogenic hormone content of the AP of the pigeon, V. Hurst, J. Meites, and C. W. Turner. (Mo. Expt. Sta.). (*Soc. Expt. Biol. and Med. Proc., 53 (1943), No. 2, pp. 89–91*).—Assays by the minimum microtechnic (E. S. R., 85, p. 607) and the method of Reece and Turner (E. S. R., 78, p. 323) of the pituitaries of 8 White King female pigeons and 3 White King males weighing about 500 gm. and 16 male and 19 female common pigeons weighing about 300 gm. showed the male pigeon pituitaries to contain only from one-half to one-third as much lactogen as the glands of females, even though the male pigeon aided in the incubation of the eggs and in feeding squabs. Per unit of body weight the pituitary of the White King pigeon had only one-half to two-thirds as much lactogen as the pituitaries of the common pigeon.

FIELD CROPS

[Farm crops research in Mississippi] (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 6, pp. 1, 2, 6, 7, 8*).—Reports are made of progress in experiments with field crops and related agronomic work in articles entitled Vine Cuttings Recommended To Increase the War-Needed Acreage of Sweetpotatoes, by W. S. Anderson (pp. 1, 8); Sugarcane Variety CP 29–116 Superior for Sirup Production, Poplarville Results Show, by T. E. Ashley (p. 2); Late Application of Nitrogen to Cotton Profitable, by C. D. Hoover (pp. 2, 6); and Nitrogen Is Plant Nutrient Needed Most by Cotton (p. 7), and One Pound of Nitrogen Material Yields 3 to 5 Pounds Lint Cotton, Tests Show (p. 8), both by R. Kuykendall and J. Pitner.

Irrigated crop rotations, Huntley Branch Station, Huntley, Montana, D. Hansen and A. H. Post. (Coop. U. S. D. A.). (*Montana Sta. Bul. 414* (*1943*), *pp. 38, illus. 7*).—Irrigated rotation experiments (E. S. R., 78, p. 36) reported on for 1912–41, inclusive, were made to determine the crops, treatments, and sequences most likely to maintain soil productivity in the area.

Under continuous cropping yields decreased appreciably during the 30 yr. Barnyard manure, at 12 spreader loads per acre annually or in alternate years, added to continuously cropped land, maintained yields at a higher level, but the yield trend was down during the later years for most crops, indicating that manure alone at that rate will not maintain high yields indefinitely. Most crops grown in 2- and 3-yr. rotations without manure produced better than when grown continuously. Manure added to similar 2- and 3-yr. rotations increased yields for several years but failed to maintain such increases. Sugar beet yields in these manured rotations were about as high 1936–41 as during 1912–17, but this did not hold for potatoes and oats. Four- and 6-yr. rotations including 2 and 3 yr., respectively, of alfalfa, without manure, maintained soil productivity for oats and potatoes but not for sugar beets. Manure added to a 6-yr. rotation including alfalfa 3 yr. increased yields of sugar beets appreciably compared to a similar unmanured rotation. Manure, rather than the alfalfa, maintained the sugar beet yields over the 30 yr. and was found essential for high yields of sugar beets.

Rotation alone or with alfalfa did not maintain yields of sugar beets, and rotations including alfalfa and manure did not maintain uniformly high yields of sugar beets for the entire 30 yr., although yields, 1936–41, were nearly as high as in 1912–17. Droppings of hogs or sheep, used to harvest certain crops in the rotation, were nearly as effective as regular applications of barnyard manure. Rotation without alfalfa or manure did not maintain potato yields, although the periodic yields were markedly higher than from continuous potatoes. Oats yields in alfalfa rotations were consistently higher than in manured rotations, reaching maxima where both alfalfa and manure were in the rotation. Rotation without alfalfa or manure resulted in much higher corn yields than from continuous corn.

The better rotations as to net income per acre were treated with barnyard manure or included alfalfa. However, manure at 12 spreader loads per acre once in each rotation period in the alfalfa or other rotations did not maintain the net acre income for the 30 yr. While crop rotation, with or without a legume and manure, did not maintain fertility of a normally productive soil, manuring resulted in a much higher yield and net income per acre throughout the years for nearly all crops.

A supplemental cropping system, including manure and N and P fertilizers, maintained high average yields for all crops and also returned a yearly net income per acre of $26.56, 1930–41. A good crop rotation including alfalfa, heavy applications of manure, and P fertilizer could maintain high average crop yields and a high net income per acre.

Length of dormancy in cereal crops and its relationship to after-harvest sprouting, S. C. CHANG. (Minn. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 6, pp. 482–490*).—Marked varietal differences were obtained, 1938–39, in the length of dormancy period and in resistance to after-harvest sprouting in spring and winter wheat, while less consistent differences existed among varieties of barley and oats. A relationship between dormancy period and sprouting resistance exists in practically all cereal varieties. Mindum and Kubanka durums did not show the same relationship between dormancy and sprouting resistance as other grain varieties, indicating that germination rate and possibly other factors, as the prevention by glumes of water penetration into the seed, determines sprouting resistance. Barley and oats varieties were more resistant to after-harvest sprouting than spring and winter wheats, probably because of their hull covering. A much higher sprouting percentage than in varieties of other crops. shown by winter wheats in 1939, is attributed to their maturing 10 days or more earlier than other crop varieties. Differences in sprouting resistance seemed usually due to differences in dormancy period and in some cases to differences in rapidity of germination.

The observer's book of British grasses, sedges, and rushes, W. J. STOKOE (*London and New York: Frederick Warne & Co., [1942], pp. 224, illus. 104*).—A popular account—illustrated in part by figures in color—of this important group of plants as represented in the British Isles, with an introduction by A. B. Jackson.

Effects of drought, temperature, and nitrogen on turf grasses, J. C. CARROLL. (Ohio Expt. Sta.). (*Plant Physiol., 18 (1943), No. 1, pp. 19–36, illus. 1*).—In a comparison of the survivals of 15 species of turf grasses exposed to soil drought and to extremes in soil and air temperatures and receiving N fertilizers, ***Poa trivialis, P. nemoralis,*** and ***Cynosurus cristatus*** were most injured by soil drought, while ***P. pratensis, Festuca rubra fallax, F. rubra, Agrostis tenuis*** (Astoria and Cocoos). and ***A. canina*** (Highland) were injured least. ***Lolium perenne, L. multiflorum, C. cristatus, A. odoratum,*** and ***A. canina*** were most injured by low soil temperatures (—5° to —20° C.), whereas those least injured were ***P. pratensis, P. nemoralis, A. tenuis,*** South German mixed bent, and ***F. rubra fallax.*** The lethal soil temperature for most of the species appeared to be between —10° and —15°. The species from the high-N section were much less resistant to cold and sustained more injury from high temperatures than those from the low-N section. Extreme soil temperatures injured the grasses more than low or high air temperatures. See an earlier note (E. S. R. 89, p. 535).

Returns from pasture treatment: Results for 1942 and comparisons with 1941, C. R. CREEK (*Massachusetts Sta., 1943, FM–13, pp. 19+, illus. 1*).—The 275 acres of pasture in 77 fields in Middlesex and Worcester Counties for which treatments and results were recorded in the 1942 grazing season ranged from intensively treated Ladino clover pastures to untreated areas of native grassland and included different types of annual and permanent pastures. Data were obtained on acreages of fertilized pasture per farm, returns in cow-days of grazing and on basis of 4-percent milk produced, cash cost for treatments, net return for milk produced, and ratio of grain fed to milk produced on pasture. Returns were higher by all measures for the pastures in 1942 than in 1941, largely due to more favorable weather conditions. Recommended seeding and fertilizing practices evidently should be followed more closely to improve pastures and produce more home-grown feed for the herd. Heavy fertilization on small acreages grazed in rotation with other fields usually produces more grazing per acre. A pasture system of permanent grassland, seeded Ladino or other clovers, annual crops, and rowen makes a full rotation and furnishes grazing throughout the season.

Pasture production and use: A study in Houston County, Minnesota, H. O. Anderson, C. H. Welch, Jr., and G. A. Pond. (Coop. U. S. D. A.). (*Minnesota Sta. Bul. 368* (*1943*), *pp. 18+, illus. 7*).—Data on physical characteristics of pastures; productivity and value; prevailing systems of pasture management, including treatments; butterfat production during winter feeding and pasture seasons; and kinds, amounts, and costs of fences and other pasture costs were obtained from a survey of a group of 120 farms located in 11 townships of Houston County and a special study of yields on 5 pastures on different degrees of slope. The area covered is typical of a sizable portion of southeastern Minnesota, where the land lies mainly in steep, narrow ridges and deep, narrow valleys. Pastures occupy one-half of the land in the county and provide from one-third to one-half of the annual feed for livestock. Nearly all the pastures studied were on steep slopes or on land that was otherwise unsuited to cultivation, and about two-thirds was wooded.

One acre of rotation pasture was estimated as equal in carrying capacity to 1.5 acres of previously cropped and open permanent pastures or to 2.6 acres of wooded pasture. Both yield and amount consumed were found greater on moderate slopes than on steeper ones. About 50 percent of the livestock production from pastures came from open permanent pastures, 19 from crop aftermath, 16 from rotation pasture, and 15 percent from wooded pasture. A total of 1,546 rods of fence, including only the farm share of boundary fence, was in use per farm in 1941, and the annual cost of fence was $66 per farm or 35 ct. per acre. Soil erosion has been most severe where vegetation is scant, and fence costs are also higher per unit of livestock pastured. Annual fence costs ranged from less than $1.50 per animal unit on farms with less than 2 acres of pasture per animal unit to over $2.50 on farms with 4 or more acres per animal unit. Interest on investment, taxes, and fence maintenance, the principal costs in pasture production, averaged about $4 per acre for rotation pasture, $2 for open permanent pasture, and $1.75 for wooded pasture. Adequate, continuous grazing for a long season requires a well-planned pasture program consisting of available permanent pasture, renovated if possible, supplemented with rotation and emergency pastures and meadow and other crop aftermath.

The trash mulch method of reclaiming broomsedge and poverty grass lands with alfalfa, H. L. Borst and R. E. Yoder. (Coop. U. S. D. A.). (*Ohio Sta. Bimo. Bul. 222* (*1943*), *pp. 114–119, illus. 1*).—Seedings made in several localities showed that the "trash mulch" method of direct establishment of alfalfa-grass meadows on "worn-out," badly eroded hill lands of eastern and southeastern Ohio possesses much promise as a means of restoring the productiveness. A procedure is recommended.

The winter survival of grass and legume plants in fall sown plots, W. J. White and W. H. Horner (*Sci. Agr., 23* (*1943*), *No. 7, pp. 399–408, illus. 1*).—Winter survival of crested wheatgrass, bromegrass, slender wheatgrass, and alfalfa in studies, 1937–38 to 1941–42, at Saskatoon, Sask., was associated closely with stages of development at freeze-up, being low in unemerged seedlings and small plants and high in large plants. Sweetclover plants were killed nearly 100 percent regardless of development stage. The three grasses responded similarly, while alfalfa had a slightly lower survival. Survival was much higher on plats sown in stubble or weeds than on summer fallow. The average survival varied from year to year, but severity of winter had little effect on survival of plants in the more advanced development stages. Crested wheatgrass, alfalfa, and sweetclover germinated well and bromegrass and slender wheatgrass poorly at 5° and 8° C.

On the establishment and growth of certain legumes on eroded and uneroded sites, H. L. Harris and W. B. Drew. (Univ. Mo.). (*Ecology, 24 (1943), No. 2, pp. 135–148, illus. 8*).—The establishment and growth of *Lespedeza stipulacea*, *L. sericea* [*cuneata*], *L. virginica*, and *Cassia fasciculata* were studied on eroded and uneroded areas of Union silt loam with and without competition. Yields were from 50 to 100 percent higher on the uneroded soil. Growth of *L. stipulacea* (Korean) was reduced by competition and was less on eroded soil, but adequate reestablishment occurred the second year on all areas. *C. fasciculata* thrived on both areas but was not adequately reestablished the second year. Sericea and *L. virginica* became established equally well on both soils the first year, but sericea did not survive the winter well on the eroded soil while *L. virginica* did. Competition affected growth the first year but did not have much effect on survival or growth the second year. Pot treatments—meeting of lime requirement, added K and P—gave completely differing results, being effective on uneroded and completely ineffective on the eroded soil. While no single treatment, except possibly N, will aid plant growth on the eroded soil and may even be harmful, several nutrients added together, including N, produce definitely increased growth on the eroded site. Concentration of minerals in the plant varied with the soil rather than with the treatment.

Food reserves and their translocation to the crown buds as related to cold and drought resistance in alfalfa, C. O Grandfield. (U. S. D. A. and Kans. Expt. Sta.). (*Jour. Agr. Res.* [*U. S.*], *67* (*1943*), *No. 2. pp. 33–47, illus. 6*).—Fall cutting experiments, 1935–40, dealt directly with processes of the alfalfa plant that influence initiation and growth of the crown buds and their relation to cold resistance. The number and development of crown buds were influenced by amount of fall top growth remaining on plants during the fall, indicating the importance of making the last cutting early enough to allow at least 6 in. of top growth to develop before the fall dormant period begins. Cutting practices favoring high food storage also favored crown bud development. That cutting practices are also closely correlated with hardening processes was shown by the amount of total water, bound water, and specific conductance. The hardening period was shown to extend from about September 1 to December 1, the most rapid changes being between October 1 and December 1. Some changes indicated that increased resistance occurred as late as January 1. During the hardening period a rapid hydrolysis of starch, the principal form of plant food storage, occurred, with subsequent translocation of the resulting sugar to the crown buds. The total N in the roots averaged 1.98 percent, dry weight. The high N content of the crown buds, 4.19 percent, may account in part for their high content of bound water. Decrease in percentage of total water was associated with the increased concentration of sugars and the high N content of the buds, which resulted in the further binding of the free water with protoplasmic compounds. Decrease in amount of free water to about 20 percent of the total water and the increased concentration of sugars lowered the freezing point of the crown bud tissue. Data in these and earlier experiments (E. S. R., 73, p. 773) indicated that food reserves are essential for developing cold resistance in alfalfa and from a practical viewpoint may be influenced by proper cutting practices.

Bromegrass and bromegrass mixtures: Culture and utilization, R F. Fuelleman, W. L. Burlison, and W. G. Kammlade (*Illinois Sta. Bul. 496* (*1943*), *pp. 473–492, illus. 5*).—General performance and yields of smooth bromegrass (*Bromus inermis*) (E. R. S., 86, p. 470) were studied, 1933–42, in tests at Urbana, Alhambra, and Dixon Springs and by field observations on farms in central Illinois.

Bromegrass was found to be outstanding in hardiness, resistance to drought and heat, palatability, and nutritiousness; to yield well; and to have a high degree of persistency as a pasture plant. While its excellent qualities are enhanced by seeding in a mixture with alfalfa, bromegrass seeded either alone or in a mixture produces good gains on cattle and sheep. This grass requires fertile soil and yields best where sown with a legume or where manure is plowed under before seeding. It has not been productive on soils of relatively low fertility. The pasture season may be prolonged as much as 4–6 weeks by using a mixture consisting mainly of bromegrass; good management will carry a good growth through the season from May to mid-October. Forage yields from bromegrass have been consistently high, and chemical analyses, as well as animal gains, show that it is nutritious. A bromegrass-alfalfa mixture nearly equals alfalfa in protein and mineral content. In tests comparing it with Kentucky bluegrass and orchard grass, bromegrass produced the most forage, made possible the largest livestock gains, and provided for the longest period of grazing, doing away with some of the need for supplementary pastures or summer feeding.

A study of the roots of Bromus inermis in relation to drought resistance, C. W. Cook. (Utah State Agr. Col.). (*Ecology, 24 (1943), No. 2, pp. 169–182, illus. 5*).—Drought-resistant selections of smooth bromegrass, compared with less resistant strains, were consistently high in numbers of both the larger, lighter colored, and the smaller, darker, and extensively branched roots, composing most of the root system; made more vigorous herbage growth throughout the season; and had greater root weights in proportion to top weights. Measurements of "large" roots were a less reliable index to drought resistance than those of "small" roots. Total axial root length, one of the best single measurements for evaluating root systems of this grass, was incomplete unless supplemented by other measurements. Resistant strains yielded significantly greater total axial lengths than nonresistant strains at each date of excavation. Methods for testing grass selections for drought resistance evidently should give more attention to the role of the root system.

How to fertilize corn effectively in Indiana, G. D. Scarseth, H. L. Cook, B. A. Krantz, and A. J. Ohlrogge (*Indiana Sta. Bul. 482 (1943), pp. 39+, illus. 14*).—Fertilizer experiments with corn, 1939–42, concerned with ratios, rates per acre, and methods of application, showed the need for adequate fertilization for high yields, particularly on poor soils. If soil fertility is so low that more nutrients are needed for a larger corn yield (70–80 bu. per acre) than are contained in 100–200 lb. of (a 3–12–12) fertilizer per acre, plus good soil management practices, extra fertilizers must be placed deep in the soil, as on the plow sole.

When acre yields approach 50–60 bu., the results indicated that a gain of from 15 to 20 bu. may, under favorable conditions, be expected from the equivalent of 400 lb. of 10–10–10 (about N 40 lb., P_2O_5 40, and K_2O 40 lb.) placed on the plow sole, in addition to the 100–200 lb. of 3–12–12 of row starter. Ratios may be varied according to the N, P, and K levels in the soil. As residual effects, these fertilizers benefit following crops, especially soybeans on limed land.

Where corn yields average about 30–40 bu. per acre, the soil probably needs N, P, K, lime, and organic matter. In this case about 800 lb. of 10–10–10 fertilizer (about N 80 lb., P_2O_5 80, and K_2O 80 lb.) is to be placed on the plow sole with a fertilizer attachment (as designed by R. H. Wileman) on the breaking plow, and a small amount of starter fertilizer, as 3–12–12, 2–12–6, or 2–16–8, applied in the row. Such treatment, with other factors favorable, may result in a 30–50-bu. increase and beneficial residual effects on succeeding crops. Straw or carbonaceous organic matter turned under on a soil well supplied with P and K should be supplemented with 300–400 lb. per acre of ammonium sulfate or cyanamide, found equally effective as ammonium N carriers. Where the soil is black and very K deficient, about 200 lb. of potassium chloride per acre should be plowed under and the usual row fertilizer applied.

Comments are made on the merits of deep placement of N and other fertilizers, advantages of plowing under at once broadcast N carriers, residual effects from heavy fertilization, relation of corn borer to fertilization, and costs and profits.

The 1942 South Dakota hybrid corn yield test, E. R. Hehn and J. E. Grafius (*South Dakota Sta. Cir. 45 (1943), pp. 23, illus. 1*).—Acre yields and other important agronomic data, including moisture at harvest, stands, smutted plants, root lodging, broken stalks, and average ear and stalk heights are tabulated for corn hybrids and open-pollinated varieties harvested in 1942 from test fields in nine districts within four sections located in the region of South Dakota east of the approximate 20-in. rainfall line. Yields and moisture percentage are also shown by districts for corn tested over periods of several years.

A note on the growth behavior of cotton bolls, D. B. Anderson and T. Kerr. (N. C. Expt. Sta. and U. S. D. A.). (*Plant Physiol., 18 (1943), No. 2, pp. 261–269, illus. 7*).—Daily and seasonal variations in the diameters of cotton bolls of the Rowden, Half-and-Half, Coker 100, Cook, and D. and P. L. varieties of upland cotton were recorded during the summers of 1940–42. Enlargement of young bolls was not inhibited by severe wilting of the parent plant. Full-sized bolls shrank in size when the parent plants were visibly wilted and regained their size during the night if low soil moisture was not a limiting factor. Degree of shrinkage of full-sized bolls was, in general, proportional to the severity of wilting of the parent plant. During periods of severe drought, shrinkage occurred later in the day and recovery during the night was partial or even entirely absent.

The growing and processing of whole cotton, F. K. Cameron (*Jour. Elisha Mitchell Sci. Soc., 59 (1943), No. 1, pp. 1–13*).—A practical account of the growing and processing of whole cotton for oil and α-cellulose. Cotton is planted close some weeks later than usual in the locality, matures about 25–30 weeks after planting, and is cut and baled. Seed cotton comprises 60 percent of the mass of whole cotton, leaves 2 percent, and the remainder about equally divided between cusps and stems. Discussion is accorded cultural, harvest, and storage methods; production costs; preparation for processing; recovery of cottonseed oil and pulping whole cotton and costs; cellulose derivatives; and uses of cellulose from whole cotton.

Influence of varietal differences on the grade of cotton, H. B. Brown and C. B. Haddon. (La. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 3, pp. 249–255*).—Ginning and grading studies were made on Delfos 531, Stoneville 2B, Deltapine, Miller, Dixie Triumph, and Wilds cottons grown, 1939–41, under unfavorable conditions at Baton Rouge, and the first three under favorable conditions at St. Joseph in northeastern Louisiana, handled at each place the same in culture, harvesting, and ginning. The long-staple, small-bolled varieties consistently ranked lowest in grade, there being about one-half grade difference between the best and poorest. As expected, lower grades were obtained from later pickings, seasonal deterioration being from one to nearly two grades. Press box samples gave slightly higher grades than bale samples.

Correlation of combed staple length on the cottonseed with commercial staple length in American upland cotton, J. H. Moore. (N. C. Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 6, pp. 491–498, illus. 5*).—Measurements of 325 samples from representative cotton varieties grown on North Carolina farms for two seasons indicated a highly significant correlation coefficient of 0.89 within samples. This fairly close relationship of combed staple length and commercial staple length is deemed of practical value in that either combed on seed or commercial staple length may be used in measuring fiber length, or one method may check the accuracy of the other. Since combed staple length on the seed can be measured by relatively inexperienced help, that method should be used wherever possible.

A method of increasing the rate of seed germination of Taraxacum kok-saghyz, J. Levitt and P. C. Hamm. (Minn. Expt. Sta.). (*Plant Physiol., 18 (1943), No. 2, pp. 288–293, illus. 13*).—Germination of kok-saghyz seed was hastened by letting the seeds absorb water in quantity insufficient to induce germination and drying them before sowing. The stimulation was obtained whether the uptake of water was controlled osmotically or by exposure to atmospheres of definite relative humidity.

Growth and composition of curled mallow, Malva crispa, W. C. Muenscher and J. K. Loosli. (Cornell Univ.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 6, pp. 544–546, illus. 1*).—Growth habits, yield, and composition are described for curled mallow from tests and analyses in 1942 The plant has been exploited to some extent as a new forage for goats and cows. "The curled mallow suggests a possible source of high-protein forage or fodder worth further investigation. When grown as an annual cultivated crop, it may yield 3 tons of dry matter on an acre, containing approximately 20 percent protein."

Factors affecting milling quality in oats, R. E. Atkins (Iowa Expt. Sta.) (*Jour. Amer. Soc. Agron., 35 (1943), No. 6, pp. 532–539*).—Hull percentage and percentage of bosom kernels were found to be the most accurate measures of milling quality in oats in a study, 1941–42, involving varieties from variety trials and selections from experimental nurseries in Iowa. Kernel weight, ratio of primary to secondary kernels, and bushel weight were of value as substantiating criteria of quality. The hull percentage of primary kernels averaged from 4 to 6 percent higher than that of the secondary kernels, probably due to a broader, heavier kernel base, attached rachillas of secondary kernels, and remnant awns of primary kernels. The Markton-Rainbow strains (Marion, Hancock, and C. I. 3350) and Sac, which appeared to be superior for milling, were low in hull percentage, produced few bosom kernels, gave high kernel and bushel weights, and had a high ratio by weight of primary to secondary kernels. Most experimental varieties and selections, largely from crosses with Bond, equaled or surpassed Marion in hull percentage, kernel weight, percentage of bosom oats, and weight per bushel, and combined in a high degree resistance to major oat diseases and were outstanding also in yielding ability. Highly significant differences were obtained for varieties, locations, and the variety × location interaction of each character studied. Significant negative correlations were obtained between hull percentage and yield, bushel weight, and kernel weight in 1941 when crown rust infection affected varietal performance materially. In 1942, hull percentage was not correlated with yield but was significantly correlated with bushel and kernel weights.

Sulfuric acid seed treatment of beach pea, Lathyrus maritimus, and silvery pea, L. littoralis, to increase germination, seedling establishment, and field stands, P. E. Lemmon, R. L. Brown, and W. E. Chapin. (U. S. D. A.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 3, pp. 177–191, illus. 5*).—Tests involving several seed lots of these legumes of different years' collections with different periods of dry storage before and after treatment indicated a definite advantage for proper sulfuric acid treatment. Seeds used responded to an optimum acid treatment of 20 min. for beach pea and 30 for silvery pea. Increased efficiency from properly treated seed would allow a lower seeding rate, and saving in seed cost per acre of 39 percent for beach pea and 24 percent for silvery pea could be made in plantings for seed production or for erosion control. Long periods of dry storage appeared to decrease the hard seed content of beach pea, with improvement in germination of untreated seed as a consequence. Preliminary tests with and without acid treatment may be advisable in treating large quantities of seed of these species with acid.

Effect of irrigation treatments on stem rot severity, plant development, yield, and quality of rice, E. M. Cralley and C. R. Adair. (Ark. Expt. Sta. and U. S. D. A.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 6, pp. 499–507*).—Average rice yields were somewhat higher from plats irrigated normally, i. e., submerged continuously during the latter part of the growing season, while stem rot severity was reduced slightly by withholding water for certain periods prior to harvest and by alternate draining and submergence during the latter part of the growing season. Early draining, when practiced in fields lightly infested with stem rot, did not increase rice yields. Different draining treatments when compared with normal irrigation practice failed to increase plant height, tillering, weight of panicle, or yield, and did not improve milling quality.

The effect of variety and environment on the equilibrium moisture content of soybean seed, A. C. Beckel and J. L. Cartter. (U. S. D. A.). (*Cereal Chem., 20 (1943), No. 3, pp. 362–368, illus. 2*).—Approximate equilibrium moisture contents of the seed of Peking, Mandarin, Scioto, Manchu, Mukden, Dunfield A, Dunfield B, and Illini soybean varieties grown at the Illinois, Indiana, Iowa, Missouri, and Ohio (Columbus) Experiment Stations were determined at eight relative humidity levels at 70° F. Significant variance due to variety and location was observed. Including all sample variance at each humidity level, the standard deviation ranged from 0.163 at the low humidity level to 0.382 at 60 percent r. h. Data at 18 percent r. h. and 70° showed that the routine moisture determination could be eliminated without affecting the accuracy of conversion of other analytical data to the dry basis.

Association of seed yield and oil content with other characters in the sunflower, E. D. Putt (*Sci. Agr., 23 (1943), No. 7, pp. 377–383*).—Correlation studies on inbred lines of Mennonite sunflowers at Saskatoon, Sask., indicated that selection for large heads and large stems will aid in procuring lines of high seed yield, and that selection for high kernel content will aid in procuring lines of high oil content. Selection of material with short stems and early maturity, desired in a type suitable for combining, evidently will not deter attainment of high-yielding lines. Indications were that small seed size, being selected to avoid damage in threshing, also aids in obtaining lines of high oil content, because a small negative correlation exists between seed size and oil content and between seed size and kernel content, which is closely associated with oil content. A positive correlation between seed yield and seed size, however, suggests that if yield is to be maintained, a small seed should be avoided unless it has a very high oil content.

The influence of various cultural practices on seed and plant characters in the sunflower, E. D. Putt and J. Unrau (*Sci. Agr., 23 (1943), No. 7, pp. 384–398*).—In cultural experiments with Mennonite sunflowers at Saskatoon, Sask., 1937–41, May 20 plantings gave higher yields of seed than earlier or later dates. The 6-in. spacing within 3-ft. rows gave a higher yield of seed with higher kernel content, lower weight per 1,000 seeds, and higher oil content than wider spacings. Date-of-harvest tests showed that plants must stand from 3 to 4 weeks after maturity before the seed is dry enough for safe storage, but such delay in harvest does not cause loss in seed yield or oil content. Maturity is considered as that stage when the back of the heads are yellow, with involucral bracts turning brown. The upper limit of absolute moisture content for safe storage of seed was between 13 8 and 13.6 percent, probably being closer to 13.8. The upper limit of free moisture content for safe storage was between 8.5 and 13.6 percent.

The yield and composition of cigar-leaf tobacco as influenced by fertilizer and preceding crop, D. E. Haley, O. E. Street, M. A. Farrell, and J. J. Reid. (Coop. U. S. D. A.). (*Pennsylvania Sta. Bul. 440 (1943), pp. 21+, illus. 3*).—Tobacco was grown, 1932–40, on land (E. S. R., 76, p. 34) in the 3-yr. rotation wheat, clover (or alfalfa), and tobacco variously fertilized, with and without manure. The influence of corn as the preceding crop was definitely superior to that of legumes in yield, quality, and absorption of N and K. When a legume was the preceding crop, its influence overshadowed effects of a given fertilizer treatment. Presence of legume stubble had a depressing effect upon both yield and quality. These effects were modified considerably by the amount and distribution of rainfall as indicated by seasonal difference in yield and composition. Regardless of fertilizer treatments, and even though in most instances relatively large quantities of both N and K were supplied the plants, both the N and K contents of the mature plants were usually too low for satisfatory yield and quality.

While cigar-leaf tobacco requires a considerable amount of moisture for its normal development, the rainfall should be well distributed throughout the entire growing season. Abrupt breaking of a drought usually results in tissue break-down, which, however, depends on the physiological age of the plant. Young plants are less susceptible than are those approaching maturity. In every season when leaf spot damage was of economic importance, tobacco following legumes suffered more than tobacco following corn.

Milling studies show that kernel size is an important factor in protein spread, ash, yield, R. O. Pence. (Kans. Expt. Sta.). (*Northwest. Miller, 215 (1943), No. 6, Sect. 2, pp. 10a–11a, illus. 3*).—Milling experiments with samples of wheat from the 1942 crop showed that a higher spread in protein content of wheat and flour may be expected if the grain contains an appreciable amount of shriveled kernels. Shriveled grain increases the ash content of the finished flour, and more wheat is needed to make a barrel of flour. Test weight of wheat appeared to be no indication of flour yield or flour quality. Certain classes of wheats evidently should be branded as feed wheat and sold as such.

Constancy of rank of durum wheats in macaroni color, E. V. Hetherington and G. S. Smith. (U. S. D. A.). (*Cereal Chem., 20 (1943), No. 3, pp. 345–351, illus. 1*).—Durum wheats (E. S. R., 84, p. 42) grown in field plats at Langdon, N. Dak., for different periods within the years 1929–35, 1937–41 were processed each year into macaroni and scored and were grouped on the basis of macaroni color—Monad and Golden Ball, similar and poor; Kubanka selections; Mindum and K-75, preferred commercially; and new hybrid strains from the breeding program. Varietal ranking for macaroni color was relatively constant regardless of seasonal fluctuations. New hybrid strains bred for improved stem rust resistance and tested in the later years were much superior in macaroni color to those available for test in the early years. A new variety or hybrid evidently may be evaluated for macaroni color from relatively few tests, if compared with Mindum or other suitable durums grown under like conditions and processed comparably.

Factors that affect keeping quality of grain storage, W. F. Geddes. (Univ. Minn.). (*Northwest. Miller, 215 (1943), No. 6, Sect. 2, p. 6a*).—Factors considered include respiration of grain and associated micro-organisms, moisture content, cracked kernels, and interseed air movement.

An illustrated guide to prairie weeds, K. W. Neatby (*Northwest Line Elevators Assoc. Bul. 2 (1941), pp. 72, illus. 124*).

Bindweed eradication in Nebraska, N. S. Hanson, F. D. Keim, and D. L. Gross (*Nebraska Sta. Cir. 50, rev. (1943), pp. 24, illus. 11*).—A revision and enlargement of the publication noted earlier (E. S. R., 73, p. 176).

HORTICULTURE

Tests of vegetable varieties for the Winter Garden region, 1937–41, L. R. Hawthorn (*Texas Sta. Bul. 626 (1943), pp. 50, illus. 15*).—This supplements an earlier bulletin (E. S. R., 78, p. 44) and contains information on the behavior and important characteristics of an additional number of vegetable varieties, many of which have been introduced recently. Included are varieties of bean, beet, carrot, sweet corn, edible cowpea, cucumber, eggplant, lettuce, muskmelon, okra, onion, pea, pepper, tomato. and watermelon. Certain of the new varieties were found to be better than existing ones with respect to certain characteristics, such as in the case of the Summerset tomato which had a capacity to set fruit under midsummer conditions when many of the usual varieties dropped their blossoms.

Germination (emergence) of vegetable seed as affected by different soil moisture conditions, L. D. Doneen and J. H. MacGillivray. (Univ. Calif.). (*Plant Physiol., 18 (1943), No. 3, pp. 524–529, illus. 1*).—Two soils were used, Yolo fine sandy loam (8.6 percent permanent wilting and 15.7 percent field capacity) and Yolo clay (permanent wilting 14.9 percent and field capacity 29.9 percent). In both soils vegetable seeds gave satisfactory field germination over the entire range of available soil moisture except for lima beans, beets, celery, lettuce, peas, and New Zealand spinach, which germinated less than 50 percent near the permanent wilting percentage. Seeds germinated more quickly at high than at low soil moistures. The vegetable crops appeared to fall into four groups based on their germination just above the permanent wilting percentage. The germination of celery was peculiar because none occurred in the Yolo sandy loam below 11 percent soil moisture.

The culture of table beets, J. H. Beattie (*U. S. Dept. Agr. Leaflet 127, rev. (1943), pp. 4*).—This is a revised edition of the earlier paper (E. S. R., 77, p. 783).

Experiments in the production of carrot seed, J. V. Enzie (*New Mexico Sta. Bul. 308 (1943), pp. 11, illus. 4*).—The carrot, a biennial plant, is normally stored over the winter and set in the field the succeeding spring for the production of seed. The results of studies showed that in southern New Mexico seed may be sown from August 15 to September 15 and the young plants winterd over directly in the field. Seed sown much later than September 15 produced smaller plants, more subject to winter injury and less productive of seed. Seed sown earlier than August 15 did not generally produce a good stand of plants. The viability of the seed obtained from autum-planted carrots ranged from 80 to 90 percent. The advantages of autumn planting lie in the saving of time and money and the removal of the storage problem and the necessity of replanting the roots. The chief objection to autumn seeding is the loss of an opportunity for grading the roots for type and color.

A descriptive and historical study of some yellow sweet corn hybrids, W. D. Enzie (*New York State Sta. Bul. 705 (1943), pp. 56+, illus. 6*).—In this further discussion (E. S. R., 81, p. 789) of yellow sweet corn hybrids there are included descriptions and comments on 38 varieties. Information is given as to the time and place of origin, trial release and introduction, and the names of persons or agencies responsible for their development. Detailed descriptions are given of the plant, ear, maturity season, and other important characteristics. Suggestions are given on adaptation for home and market garden uses and for commercial freezing and canning. The earliest variety among the thirty-eight was Seneca 60 × C13. Among late varieties, Sunny-Gold and Tendermost were outstanding with respect to yield and quality. The midseason varieties Carmelcross, Hybrid 6604, Vinecross B5, Lincoln, and Lee were among the best in quality, with Vinecross B5 particularly desirable.

Increased earliness of flowering in lettuce through vernalization, S. G. GRAY (*Jour. Council Sci. and Indus. Res.* [*Austral.*], *15* (*1942*), *No. 3*, *pp. 211–212*).—Sprouted lettuce seeds held at 39.2° F. (4° C.) for periods of 28, 42, and 56 days were found to produce seedstalks from 2 to 3 weeks earlier than plants raised from untreated seed of the same lots. There was no important difference in behavior among the 28-, 42-, and 56-day treatments.

Nutritional relationships of boron and indoleacetic acid in head lettuce, A. D. MOINAT. (Colo. State Col.). (*Plant Physiol.*, *18* (*1943*), *No. 3*, *pp. 517–523*, *illus. 2*).—Lettuce plants of the New York variety grown in sand culture using Hoagland nutrient solution were supplied with boron and indoleacetic acid in different concentrations. As little as 0.005 p. p. m. of boron in the nutrient solution induced excellent growth of head lettuce and prevented death of cells at the growing point as well as other boron deficiency symptoms. Five p. p. m. of boron were definitely toxic and caused a marked decline in fresh and dry weights. The addition of 0.25 p. p. m. of boron appeared to be optimum for the production of green weight of leaves. Indoleacetic acid sprayed on the leaves produced plants with open heads, lighter green color, and shorter and thicker stems in summer-grown plants There was no evidence that indoleacetic acid replaced boron in promoting normal growth and development. Neither boron nor indoleacetic acid prevented tipburn. There was a lower percentage of water in the shoots of plants grown with a deficiency of boron than in those grown with adequate boron.

Preparation of synthetic composts for mushroom culture, B. B. STOLLER (*Plant Physiol.*, *18* (*1943*), *No. 3*, *pp. 397–414*, *illus. 2*).—A method is described for preparing synthetic compost for mushroom culture from various materials to produce about 13 lb. N, 4 lb. P_2O_5, and 10 lb. K_2O in a ton of fibrous matter having 70 percent moisture after allowing for the quantities of these three constituents present in the fibrous material. The omission of potash has apparently been one of the chief inadequacies of previously used composts. The yields were almost doubled where K_2O was used in addition to N and P_2O_5. A process is described in which tannin and lignin extracts are combined with nitrogenous material in order to avoid the lengthy outdoor composting period.

Spartan Hybrid—a first generation hybrid tomato for greenhouse production, K. C. BARRONS. (Mich. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc.*, *42* (*1943*), *pp. 524–528*, *illus. 1*).—Spartan Hybrid, a new tomato obtained by crossing Michigan State Forcing with Cooper Special, was significantly more productive than its Michigan State Forcing parent, and the fruits were of satisfactory color, size, shape, and smoothness. From its Cooper Special parent of a determinate type of growth, the Spartan Hybrid inherited short internodes with the result that more clusters of fruit were produced for a given height of plant. The fruit began to ripen 1 week to 10 days ahead of its Michigan State Forcing parent. The increased yield of hybrid tomatoes is said to be of particular significance in the greenhouse, where the fruit commands a price sufficient to cover the cost of the hybrid seed.

Composition of the tomato plant as influenced by nutrient supply, in relation to fruiting, D. I. ARNON and D. R. HOAGLAND. (Univ. Calif.). (*Bot. Gaz.*, *104* (*1943*), *No. 4*, *pp. 576–590*, *illus. 7*).—Studies with tomato plants grown through the fruiting stage under greenhouse conditions in soil, sand, and large-scale water cultures, supplied with nutrient solutions of varying composition, showed that the composition of the fruit, as contrasted with the modifiable composition of the foliage, is relatively constant and not easily influenced by changes in nutrient supply. However, a total lack of either K or P in the nutrient medium was reflected in a decrease of K or P in the fruit. Defloration symptoms indicated that the growing fruits in the case of inadequate nutrient supplies draw on the P and K reserves of the leaves. The downward Ca and Mg gradients found in plants grown in a complete nutrient medium were also observed in the leaves of K-deficient plants. Defloration of plants grown in a P-deficient nutrient solution delayed the onset of P-deficiency symptoms and was associated with a higher P content in the young leaves.

Effects of micro-nutrient deficiencies on growth and vitamin content of the tomato, C. B. Lyon, K. C. Beeson, and G. H. Ellis. (U. S. D. A.). (*Bot. Gaz., 104 (1943), No. 4, pp. 495–514, illus. 3*).—Tomato plants grown with deficiencies of Mn, Cu, Zn, and Fe made considerably less growth and produced less fruit than did plants supplied with complete nutrients. Mo deficiency, on the other hand, did not noticeably affect growth and fruiting. In general, leaflets and fruits of plants grown with limited Mn, Fe, Zn, and Mo contained smaller quantities of these elements than did the control plants. The external symptoms of the several deficiencies are described. Ascorbic acid content of the fruits was not affected by limitations in the supply of Mn, Zn, Cu, and Mo. On a fresh weight basis, there was 30 percent more ascorbic acid in the fruits of Fe-deficient tomato plants than in the controls. Slight variations in riboflavin content of fruits were correlated with deficiencies and with the position of the plants in the greenhouse. Provitamin A content was not significantly affected by limitations in the supply of micronutrients.

Comparative injury to tomato plants by ingredients of fungicidal spray and dust mixtures, J. D. Wilson (*Ohio Sta. Bimo. Bul. 222 (1943), pp. 120–133, illus. 8*).—The injurious properties of a number of ingredients of fungicidal spray and dust formulas were determined on tomato plants growing in a greenhouse during the winter months. Two clays were the most harmful of a number of diluents, followed by whiting and three talcs. Wheat flour was much less injurious than bentonite. Hydrated lime, one of the materials used in preparing bordeaux mixture and copper-lime dust, was found to be one of the most harmful materials. Sprays were usually more injurious than dusts. When a copper oxychloride was added to the diluent materials under test, the degree of injury was increased slightly in some instances. In trials with a series of 14 fixed copper and other materials mixed with various diluents, practically all the copper-containing compounds were most harmful when mixed with bentonite and least when mixed with derris root or EM talc. When the average injury caused by the different copper-containing compounds with each of the added materials was considered, the greatest harm was caused by bordeaux mixture.

What's a vegetable, what's a fruit? J. H. Gourley (*Ohio Sta. Bimo. Bul. 222 (1943), p. 145*).—This brief article points out the botanical distinctions between vegetables and fruits and discusses certain popular misconceptions.

Propagation of fruit trees, H. A. Cardinell and F. N. Hewetson (*Michigan Sta. Spec. Bul. 142, rev. (1943), pp. 55, illus. 37*).—This is the fourth printing and the second revision of a bulletin originally issued in 1925 (E. S. R., 53, p. 39). Special emphasis is laid upon the different methods of grafting fruit trees.

Nursery fruit trees, dwarf and standard understocks, their handling and planting, E. L. Overholser, F. L. Overley, J. H. Schultz, and D. F. All-

Mendinger (*Washington Sta. Pop. Bul. 170 (1943), pp. 63, illus. 13*).—General information is offered on understocks for fruit, with special reference to the Malling stocks for apples; methods of propagating, transplanting, and handling nursery stocks; the growth and productivity of trees on various understocks; disease problems with nursery stocks; pollination problems with apples, pears, plums, cherries, and other fruits; planting arrangements; use of interplants or fillers; protection from rodents, etc.

Fertilizers and covercrops for California deciduous orchards, E. L. Proebsting (*California Sta. Cir. 354 (1943), pp. 15*).—General information is offered on the orchard fertilizer situation, ways of determining the need for fertilizers, deficiency symptoms in the tree and fruit, the desirability of practical tests, fertilization practices, uses and function of cover crops, sod culture, etc.

Spray-residue removal from apples and other fruits, M. H. Haller, E. Smith, and A. L. Ryall (*U. S. Dept. Agr., Farmers' Bul. 1752, rev. (1943), pp. 21+, illus. 4*).—Information is presented in this revised bulletin (E. S. R., 74, p. 200) as to the problem, equipment, solutions, and procedures; cost of washing; and the specific requirements in washing apples, pears, cherries, grapes, and currants, and cleaning peaches.

Breaking the "rest period" of deciduous trees, H. T. Kriel (*Farming in So. Africa,, 18 (1943), No. 206, pp. 321–322, illus. 3*).—Preliminary studies indicated that the rest period of peaches, plums, and some other species may be broken by injecting a 2.5-percent solution of sodium thiosulfate in an acid medium into the branches.

Sugars in relation to color and thiocyanate spray in apples, R. H. Leonard and R. B. Dustman. (W. Va. Expt. Sta.). (*Plant Physiol., 18 (1943), No. 3, pp. 488–497*).—Fruits showing both a red and a green side of approximately equal area were harvested from trees which had or had not been sprayed with thiocyanate in addition to the usual sprays for insect and disease control. Regardless of the treatment, dry matter and sugars were higher on the red side, and dextrose showed the greatest relative difference between the two sides. In general, spraying with thiocyanate appeared to have lowered most of the constituents determined. Evidence was obtained that the thiocyanate spray penetrates the apple skin and affects the layers of tissue immediately beneath. Although the thiocyanate caused a decrease of sugars in Rome Beauty apples at harvesttime, after 4 mo. of storage these fruits had a higher sugar content than comparable ones not sprayed with thiocyanate.

Growth regulators and fruit set with Starking apples, L. Greene. (Ind. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 149–150*).—The Starking Delicious apple is said to set unfavorably in certain seasons, even when ample pollination is provided. Attempts to increase fruit setting by the application of lanolin paste containing naphthaleneacetic, indolebutyric, idoleacetic, or indolepropionic acids to the cut style or cut style and receptacle of Starking flowers resulted in their death or failure to develop further. Even where no floral parts were removed or cut prior to treatment, there was no fruit set. Applications of the substances in spray form were not as destructive, but there was concrete evidence that concentrations above 0.005 percent would be unsafe on the apple at flowering time. Naphthaleneacetic acid in wax emulsions sprayed on small fruits nearly 1 mo. after full bloom retarded the growth of the fruit and prevented its normal development.

Descriptions of apple varieties, J. K. Shaw (*Massachusetts Sta. Bul. 403 (1943), pp. 187, illus. 164*).—Descriptions are presented of the vegetative characteristics of a large number of apple varieties, with illustrations of flowers, leaves, and small nursery trees. The habit of growth of the young tree; the color of the bark; the size, shape, and color of the lenticels; and the shape, fold, and serrations of the leaf are among the important features that permit the distinguishing of varieties in the nursery stage.

Studies in the nature of the clonal variety.—IV, Cytological studies of bud sports of McIntosh, Stark, and Baldwin apples, E H. NEWCOMER (*Michigan Sta. Tech. Bul. 187 (1943), pp. 23, illus. 117*).—This is the fourth of the series. All of the materials used in this cytological study were collected from station orchards near Grand Rapids, Mich., where the trees had been growing for some years under careful observation. The results of the study indicated that some of the bud sports of the McIntosh, Stark, and Baldwin apples are caused by structural chromosomal changes in somatic tissues, such as inversions and translocations, with the possible secondary changes of reduplications or deficiencies coupled with somatic segregation. There is a possibility that some of the mutants are periclinal chimeras, but meiotic irregularities due to structural chromosomal changes suggest that most of the mutants observed in the study are fundamental and carried by the germ plasm. A new chromosome number of $2n=42$ is reported for the Stark apple. Primary multivalent pairing which was interpreted as due to interchange hybridity was observed in three selections of the McIntosh apple. Two bivalent chromosomes are involved in nucleolar formation in the McIntosh, Stark, and Baldwin apples. Generational sterility resulting from meiotic irregularities is suggested as a cause of some of the observed sterility in apples. The meiotic behavior of these bud sports suggests a trend toward aposporic parthenogenesis.

The effect of the rootstocks on nine years' growth and yield of four apple varieties, R. H. SUDDS and P. C. MARTH. (W. Va Expt. Sta. and U. S D. A.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 326–334*).—Information is presented on the growth and yield of Gallia Beauty, Starking Delicious, Staymared Stayman, and York Imperial apples grown on nine clonal and eight seedling rootstocks. None of the rootstocks induced extreme dwarfing of the tops of all four varieties, but certain combinations resulted in very dwarfed trees. A series of comparisons by varieties made between the top weights of the trees on clonal and on seedling roots showed the clones to be somewhat more uniform, but the differences were not statistically significant. The authors suggest that soil variability had probably masked to a large extent any superior uniformity that may have been possessed by the clonal rootstocks. Outstanding among the various stocks, on the basis of growth and yield of the resulting trees of all four varieties, were clone 316 and Jonathan seedlings.

Scion rooting of apple grafts as related to the vegetativeness of the scions used, F. B. LINCOLN. (Md. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 335–336, illus. 1*).—Apple grafts made up of scions taken from bearing and from strongly vegetative trees were set in sandy soil with the upper bud exposed, and after 2 yr. were dug and examined. Young Stayman Winesap trees with scions from bearing parents showed 50 percent of scion rooting as compared with 12.5 percent for those composed of scions from vegetative trees grafted on seedling roots. With Starking Delicious there was 100 percent of scion rooting in the group made up of scions from fruiting trees as compared with 20.4 percent of rooting in the vegetative scions, with both groups on seedling roots. Comparable results were obtained with Gallia Beauty and York Imperial, all of which leads the author to suggest that if scion rooting is desired the scions should be taken from fruiting trees.

A comparison of the variability in the top weight and yield of five varieties of apples grown on their own and seedling roots, E W. GREVE. (Univ.

Del.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 337–341*).—At the end of 13 yr. in the orchard Yellow Transparent, Grimes Golden, Delicious, Stayman Winesap, and Rome Beauty trees growing on their own roots were cut off at the ground level and weighed. In all five varieties the trees were heavier in the own-rooted than on the seedling-rooted groups, but the differences lacked significance. Except for Yellow Transparent, the average yield per tree during the final 6 yr. in the orchard was significantly greater in the case of seedling-rooted trees. Variability in yield was greater for the own-rooted trees except for Stayman Winesap. However, the differences in variability were significant only in the case of Rome Beauty.

Apple stocks exhibiting noninfectious hairy root and their use in bench grafting, E. A. SIEGLER. (U. S. D. A.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 342–348, illus. 5*).—A supply of rootstocks was obtained by growing root cuttings of clonal material originally taken from 1-yr. domestic seedlings of horticultural varieties of apples, selected because they exhibited symptoms of noninfectious hairy root. These were grafted in February on the basal 4- to 5-in. portions approximately at the region where the stem tissue had been exposed above the mounded plant. After storage for callusing, the grafts were planted in the early spring and were so handled as to prevent scion rooting. An excellent stand of good-sized young nursery trees resulted, indicating that the method may be practicable with the type of material used.

Virginia Crab as an own-rooted and an intermediate stock, J. A. MCCLINTOCK. (Ind. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943) pp. 353–356*).—French crab seedlings were pruned to whips and budded to Virginia Crab at heights ranging from 6 to 52 in. above the soil. For comparison, Virginia Crab was whip grafted on a short piece of French crab seedling root or budded on French crab seedlings at or near the crown. In such cases, the Virginia Crab scions rooted and formed shortly own-rooted trees. Numerous suckers and laterals developed on the crowns and trunks of the high-worked French crab stocks, and their removal opened the way for certain diseases. Growth records on the various trees at 7 yr. showed much larger diameter growth in Virginia Crab on its own roots than when worked at various heights on French crab. It was evident that Virginia Crab on French crab roots is unable to make its potential development.

The dwarfing effect of an intermediate stem-piece of Malling IX apple, H. B. TUKEY and K. D. BRASE. (N. Y. State Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 357–364, illus. 5*).—The interposition of a 3-in. piece of Malling IX scion wood between the French crab seedling root pieces and top scions of Baldwin, Delicious, Early McIntosh, and McIntosh resulted in smaller and earlier fruiting trees than were obtained by working the same scion varieties directly on French crab roots. The double-worked trees with Malling IX as intermediates were, however, only slightly smaller and slightly earlier in fruiting than comparable trees with McIntosh as the intermediate piece. Trees worked directly on Malling IX were decidedly smaller and earlier to bear than those produced by double grafting with Malling IX as the intermediate.

Malling stocks and French crab seedlings as stocks for five varieties of apples, III, W. H. UPSHALL (*Sci. Agr., 23 (1943), No. 9, pp. 537–545, illus. 11*).—In this third paper (E. S. R., 79, p. 629), the author reports no significant differences between varieties of apples on French crab and on Malling XVI rootstocks. Trees on Malling I and II were on the average about three-fourths the size of trees on French crab roots. Delicious trees on both Malling I and II showed a tendency to blow over when young. With the trees now 13 yr. in the orchard, the yields have been rather uniform, the smaller trees on Malling I and II making up in productiveness for what they had lost in size. Usually Malling I and II stocks produced somewhat more grade 1 fruit, slightly smaller in size than that grown on Malling XVI and French crab stocks. Trees on French crab were no more variable in growth and fruiting than were those on clonal roots. Trees on Malling IX were dwarfed and had fruited well, but required staking to prevent breaking at the union.

Relationship between number of fruiting branches and yield of apples per tree, C. W. Ellenwood (*Ohio Sta. Bimo. Bul. 222 (1943), p. 137*).—Records taken on the yield of individual branches of Stayman Winesap and Delicious apple trees showed a remarkably uniform performance in the Stayman Winesap regardless of the total number of fruiting branches on the trees. The Delicious was not as uniform in behavior. On 23 Delicious trees as a whole the average annual yield per fruiting branch for 1941 and 1942 was slightly over 2 lb. and on the 17 Stayman Winesap trees 2.5 lb. per branch.

Crops and cultural practices on former apple orchard land, L. Verner and G. W. Woodbury (*Idaho Sta. Bul. 250 (1943), pp. 18, illus. 9*).—The removal in 1936 of 9 acres of mature apple trees from a station orchard located at Parma, Idaho, afforded an opportunity to study the effects of the old orchard and of various cultural and fertilizer treatments on the behavior of subsequent plantings of tree fruits, small fruits, and vegetables. There was evidence in the station orchards and in various commercial orchards that cleared orchard areas are likely to be unfavorable to succeeding crops because of accumulated spray residual materials in the soil and the poor physical condition of the soil. The results of the experiment indicated that old orchard soil may be reclaimed most quickly and economically by the liberal use of barnyard manure and by growing nonlegume cover crops for 1 yr. or more. Of cover crops, winter rye and Sudan grass proved most useful. When growth of the cover crops was no longer impeded materially, usually within a 2- to 4-yr. period, most fruits and several vegetables and field crops could be grown again profitably. Of row crops, potatoes and sugar beets were usually the first to make satisfactory growth following the removal of orchard trees. Legumes, such as alfalfa, clovers, beans, and peas, were usually unsatisfactory on such soils until 5 yr. or more after the trees had been removed.

Effect of heavy mulch in an apple orchard upon several soil constituents and the mineral content of foliage and fruit, I. W. Wander and J. H. Gourley. (Ohio Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 1–6, illus. 8*).—Further studies (E. S. R., 80, p. 50) in an orchard at Wooster, Ohio, planted in 1915 and managed half on the cultivation cover crop plan and half on the sod mulch system, with no fertilizer or manure applied to either block, showed that certain elements as well as K are increased below the mulch. Exchangeable K was considerably increased under the mulch to a depth of 24 in., the maximum sampled. There was considerably more exchangeable Ca in the surface soil beneath the mulch than at the same depth under tillage. There was some accumulation of Ca at the 24-in. level under mulch, with less between the 6- and 18-in. levels than under cultivation. With Mg, the highest values were found at the two lowest depths under clean culture, with some increment in the upper 12 in. under mulch. Readily available P, water-soluble B, and percentage of organic matter were increased in the upper 6 in. of soil beneath mulch. The K and P contents of both the leaves and fruit were increased by mulching. The Ca and Mg contents of the leaves were decreased by mulching, and Ca was lower in the flesh and cores of fruit harvested in the mulched plats. K, P, and Mg were more abundant in the fruits of the mulched than in those of the cultivated trees. B was practically equal in the fruit of both blocks, and slightly higher in the leaves of the mulched trees.

The effect of different methods of soil management upon the potassium content of apple and peach leaves, C. E. BAKER. (Ind. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 39 (1941), pp. 33–37*).—Analyses of representative samples of leaves collected from Grimes Golden apple trees under different cultural treatments showed a high K content of leaves from trees mulched with strawy manure as compared with leaves of trees in cultivation or in sod. In general, trees in cultivation to which KCl was applied alone or in combination with superphosphate or sulfate of ammonia did not show as much K in their terminal leaves as did trees mulched with straw or strawy manure. An inorganic mulch of spun glass wool was helpful in shading, checking evaporation, and aiding in moisture penetration. Where peach trees were mulched with straw or alfalfa there was an increase in the K content of the terminal leaves. Mulches brought young peach trees through a drought in 1939 in better condition than unmulched trees. In both the peach and the apple the K content of the leaves tended to be higher in the early part of the growing season. With peaches there was a slight but rather consistent increase in P in leaf samples of mulched trees above those of the unmulched.

Further results on the effect of different mulching and fertilizer treatments upon the potassium content of apple leaves, C. E. BAKER. (Ind. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 7–10*).—In continuance of the work noted above the author reports that in 1942, following an abundant crop of fruit in 1941, there was no consistently higher level of K in the leaves of Grimes Golden trees that bore practically no fruit in 1942 than was found in 1941. There was little indication that K applied to the soil in the form of KCl was reaching the leaves. In fact, the cultivated trees that received no K often had more K in their leaves than did trees receiving KCl.

In a test of various mulching materials, including tobacco stems, straw, cinders, glass wool, paper, and manure, the inorganic materials glass and cinder produced practically the same increases in K content of the leaves as did the organic materials that are known to contain considerable quantities of soluble K. All of the mulches stimulated greatly the growth of fibrous roots in the upper soil layer, but in the case of the organics the roots penetrated the mulch. The author considers it probable that the moist condition under all mulches tended to maintain the K in a more constantly available condition.

Magnesium deficiency in Massachusetts apple orchards, L. SOUTHWICK. (Mass. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 85–94, illus. 4*).—Foliage scorch symptomatic of Mg deficiency was observed in several apple orchards in Massachusetts. Chemical analyses of leaves from trees showing variable degrees of scorch and leaf fall showed consistent correlations between the severity of injury and the contents of Mg and K. The indications were that K was concerned with the prevalence and severity of Mg injury. Apparently an Mg content of 0.25 percent of the dry matter of the leaf was near the critical level.

Notes and observations from a study of water core in Illinois apples during the 1942 season, D. S. BROWN. (Univ. Ill.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 267–269*).—The incidence of water core was always associated with the vascular supply of the apple. In most varieties water core appeared first around the toral bundles or the traces which diverge from them into the flesh. In every apple examined, the amount of starch in the water-cored tissues appeared to be equal to, or sometimes greater than, that in the nonwater-cored tissue. In general, the number or proportion of affected apples increased with the approach of maturity. Samples of water-cored apples were higher in percentage of dry matter than nonwater-cored apples picked at the same time. The expressed juice of water-cored fruits was usually higher in soluble solids and lower in titratable acid than that from noncored fruits. Apparently the starch to sugar conversion within the fruits was not important in the incidence of water core. The author suggests that some happening within the tree, the spur, or cluster base may cause an influx of water and solutes into the fruit under some degree of pressure.

Southern pear breeding, B. D DRAIN. (Tenn. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 301–304, illus. 1*).—Of 156 progenies resulting from crosses made in 1932 and 1933 between the oriental pears *Pyrus serrulata, P. calleryana,* and *P. ussuriensis* and horticultural varieties, 28.8 percent had not blighted, but none of them appeared promising horticulturally. In another group of 1,586 progenies containing one-fourth *P. serotina* (=*pyrifolia*) and three-fourths *P. communis*, 51.5 percent were free of fire blight, and a number of the seedlings were rated good or better. Seckel, Vermont Beauty, and Worden Seckel tended to yield weak-growing seedlings that were rather high in leaf spot susceptibility. In a third group containing but one-eighth of *P. pyrifolia* ancestry the trees were only 3 yr. of age and were too young for evaluation. Hybrid pears varied greatly in their susceptibility to defoliation in summer. For example, Duchesse d'Angouleme appeared to contribute a larger degree of resistance on the average than did Seckel. The occurrence of a small percentage of small-fruited but healthy seedlings from crosses between large-fruited parents is considered the possible result of an accumulation of recessive genes.

Studies in the nature of the clonal variety.—III, Permanence of strain and other differences in the Montmorency cherry, V. R. GARDNER (*Michigan Sta. Tech. Bul. 186 (1943), pp. 20, illus. 6*).—This paper, the third in a series (E. S. R., 89, p. 219), deals with the results of studies upon a large group of Montmorency cherry trees consisting of scions taken from mature trees of known performance budded on uniform commercial seedlings. The results indicated that some of the differences in 1- and 2-year-old nursery trees of Montmorency cherry are due to (1) the existence of intravarietal strains and (2) the influence of a virus disease causing yellowing and premature dropping of the leaves. Differences due to strain or to virus infection exerted an effect on the tree that becomes more evident with age. Subsequent performance of the trees in the orchard is the only accurate index to the causes of the early differences. The author suggests that nurserymen and growers should obtain budwood and trees only from those strains that are vigorous and are free of virus infections. Within each strain there are size differences, due presumably to environmental conditions such as fertility and moisture, to spacing in the row, and to the size of the understock. Differences of this kind are gradually outgrown in the orchard and do not provide the tree with a permanent handicap or benefit.

Identification of certain red and purple raspberry varieties by means of primocanes, O. C. ROBERTS and A. S. COLBY. (Mass. Expt. Sta. and Univ. Ill.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 457–462, illus. 3*).—The results of a study of 30 red- and purple-fruited raspberries indicated that varieties of these fruits may be distinguished in the vegetative stage by certain characters of the primocanes, such as the nature of the prickles, cane color, amount of bloom, pubescence, shape of the primary leaves, the fold and rugosity of the leaves, etc.

Three-year-old fruiting canes in the Latham raspberry, W. G. BRIERLEY. (Minn. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 444–446, illus. 1*).—By preventing the development of new canes and by disbudding, the life of the second-year canes on Latham raspberry plants was prolonged into the third year, although the raspberry cane is normally biennial in habit. The 3-yr. canes were not vigorous, but did produce a few fruiting laterals which matured some berries.

Strawberry breeding and the inheritance of certain characteristics, J. P. OVERCASH, L. A. FISTER, and B. D. DRAIN. (Tenn. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 435–440*).—Since 1938 the Tennessee Station has introduced three varieties of strawberries, namely, Tennessee Supreme, Tennessee Shipper, and Tennessee Beauty, all of which had Missionary as the mother parent. The authors point out various parents and parental combinations that have proved desirable and transmit marked characteristics in plant and fruit. For example, seedlings with Fairfax as one parent were good plant makers. Fairfax transmitted its dark color, good flavor, and sweetness to many of its progeny, but many of the seedlings bore fruit rough and irregular in shape. British Sovereign proved to be a poor parent in Tennessee. There was evidence that the crossing of inbred lines may be a desirable method of developing new strawberries.

Cold resistance of strawberry plants in the early stages of growth, W. G. BRIERLEY and R. H. LANDON. (Minn. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 432–434*).—In the spring of 1938 Beaver and Dunlap strawberry plants that had not been mulched and were beginning to unfold new leaves withstood a minimum air temperature of 19° F. without apparent injury. In 1939, plants of the same varieties withstood 20° and 16° without subsequent loss in production. In 1941, plants of eight varieties that were uncovered on April 1 were after 2 weeks favorable for growth placed in control chambers for 24 hr. at 10°, 16°, 21°, and 27°. All plants were killed at 10° and 16°. None was killed at 27°. Exposure at 21° resulted in injury, but 18 of the 80 plants survived and grew vigorously. There was considerable varietal difference not correlated with the field hardiness of the varieties.

The response of strawberries to boron, L. P. LATIMER. (N. H. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 441–443*).—Experiments designed to determine the requirements of the strawberry plant for boron led to the general conclusion that the strawberry plant is highly sensitive to this element and, under New Hampshire conditions, more than 5 lb. of boron or 25 lb. of borax will be distinctly harmful. In fact, in one of the experiments the largest yields were obtained from the untreated control plats.

Essentials of blueberry culture, S. JOHNSTON (*Michigan Sta. Cir. 188 (1943), pp. 27+, illus. 18*).—General information is offered on the selection of sites, soil requirements, varieties, propagation, field planting, pollination requirements, cultivation, fertilizing, pruning, control of insects and diseases, harvesting, marketing, etc.

Blossom induction of the cranberry, R. H. ROBERTS and B. E. STRUCKMEYER, (Univ. Wis.). (*Plant Physiol., 18 (1943), No. 3, pp. 534–536, illus. 2*).—The first sign of blossom bud formation in untreated uprights of the McFarlin cranberry was observed microscopically on July 29. Defoliation experiments indicated, however, that induction actually took place about July 10 since uprights developed on July 8 formed practically no buds. The percentages of differentiation on shoots defoliated June 4, 10, 18, 25, 30; July 8, 15, 21, 29; and August 4 and 13 were, respectively, 100, 45.5, 28.5, 21.5, 12.5, 0, 38.4, 54.5, 59.1, 72.7, and 80.

Grape regions of the United States, C. A. MAGOON and E. SNYDER. (U. S. D. A.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 425–431, illus. 2*).—The grape-growing areas of the United States are divided into nine distinct regions, for which climatic data are presented and the type of adapted varieties indicated.

An evaluation of the use of French hybrid wine grapes in breeding hardy grapes for the eastern United States, G. D. OBERLE. (N. Y. State Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 413–417*).—The improvement in quality obtained from the use of *Vitis vinifera* in the development of hardy grapes for the Northeast is offset by a decrease in hardiness and in resistance to disease and insects in the seedlings. A number of hybrids developed by European grape breeders from crosses of vinifera and American grapes were used in crosses with such varieties as Brocton, Elvira, Fredonia, and Ontario. In general, the winter hardiness of the resulting seedlings was satisfactory. Crosses involving Fredonia showed great susceptibility to mildew. In general vigor was exceptional, based apparently on heterosis due to distantly related species in the hereditary background. Some of the seedlings were highly productive. Fruit quality was difficult to measure because many of the new grapes should be evaluated on the basis of wine tests. Combinations with Seneca as one parent were outstanding in the proportion of seedlings considered worthy of propagation for further trials. *V. riparia* and *V. aestivalis* flavors were present in some of the seedlings, and the foxiness of *V. labrusca* also appeared in certain crossses.

Selection for fruit color in the Emperor grape, H. P. OLMO and A. D. RIZZI. (Univ. Calif. and U. S. D. A.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 395–400, illus. 1*).—The failure of Emperor grapes to color satisfactorily is a real problem in certain California vineyards. Color ratings made over a period of years on the crop of certain vines in four vineyards indicated that each vine tends to produce fruit of about the same color year after year. The adjacent location in many cases of poorly or well-colored vines suggested the possibility that color variation was hereditary. Cuttings taken from vines differing in the coloration of the fruit were grown on known rootstocks, and an examination of the fruit showed the new vines to produce fruit of the same characteristic color as the parent. The grapes with poor color had invariably a lower sugar content than those of good color. The vines producing poorly colored fruits became noticeably redder and more bronzed earlier in the autumn. Crosses were made to determine whether the color characteristic was genetic. A practical suggestion is made that growers mark for propagation those vines bearing well-colored fruits over a period of years.

Pollination of the Almeria grape, H. P. OLMO. (Univ. Calif.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 401–406*).—Cross-pollination of the Almeria (=Ohanez) grape is generally practiced in Spain. At Davis, Calif., over 100,000 pollen grains of Ohanez were cultured without any tube development being observed. The pollen grains were evidently without germ pores. No fruit was obtained when clusters were enclosed before blooming. A partial set was produced when grapes were pollinated with their own pollen, and a few viable seeds were obtained. Apparently in the vineyard honeybees and other insects cross-pollinated the Ohanez grape. Wind was shown also to be effective, and at Davis it is apparently an important factor in pollination of this variety.

The influence of time and method of pruning on yields of muscadine grapes, N. H. LOOMIS. (U. S. D. A.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 418–420*).—Muscadine grapes are said to bleed severely if pruning is delayed much after the leaves drop in autumn In these trials at Meridian, Miss., in which Scuppernong and Thomas vines were pruned by the spur and the cane methods at different times, there was no significant difference in yield related to the time of pruning. Spur pruning was much better than cane with respect to yields. Chemical and refractometer tests of the sap extracted from pruning wounds showed the same to consist almost entirely of water.

Observations on the response of grape vines to winter temperatures as related to their dormancy requirements, C. A. Magoon and I. W. Dix. (U. S. D. A.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 407–412, illus. 2*).—After different periods of exposure to outdoor temperatures in early winter, potted vines of hardy, intermediate, and southern-type grapes were brought into a greenhouse at from 60° to 70° F. In the 2 yr. that the tests were conducted, the minimum temperatures reached in the hardening period were 6° and —3°, respectively. In both seasons a period of 200 hr. below 45° was not too short to prevent foliation in any of the varieties. However, with longer exposures the time required in the greenhouse to initiate leaf growth was materially shortened. An exposure of 1,000 to 1,200 hr. below 45° appeared to satisfy all requirements. It was evident that eastern bunch grapes have a low requirement for low-temperature exposure, with indications that the shortness of the rest period of northern grapes grown under southern conditions is not an important factor in their longevity.

Initial results from grape fertilizer plots, W. O. Williams. (Univ. Calif.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 421–424*).—Comparisons of N alone with NPK as fertilizer for vinifera grapes in several California vineyards indicated that N, when used alone, was generally beneficial in increasing yields. In 12 of 13 plats, N increased yields on an average of 9.4 percent. The gains from NPK averaged only 4.5 percent, suggesting a depression on the part of the P and K when used with N. The quality, as measured by color, acidity, and sugar contents, was generally lower in the fertilized vines. Growth was not significantly affected by either treatment.

A manual of tropical citrus culture, C. C. S. Stephenson (*Colombo, Ceylon: Harrisons & Crosfield, Ltd., H. & C. Press, 1942, 2. Eng. ed., pp. 88+, illus. 11*).—This book contains general information for the grower regarding varieties, propagation, culture, pruning, control of insect and disease pests, preservation of the fruit, dietetic value of citrus, etc.

Failure of vetch to excrete nitrogen from the nodules when grown in association with nitrogen-deficient citrus seedlings, H. D. Chapman. (Calif. Citrus Expt. Sta.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 7, pp. 635–637, illus. 1*).—Inoculated seed of purple vetch sown in the soil in 2-gal. pots containing two seedling sweet oranges resulted in good germination and substantial growth of the vetch, but no apparent benefit to the oranges, which had ceased growth and turned extremely yellow because of the deficiency of N in the soil. There was evidently no significant excretion of root nodule N from the vetch plants despite their vigorous growth and abundant nodulation.

Rootstock influence on the composition of Valencia orange fruit, F. F. Halma. (Univ. Calif.). *Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 349–352, illus. 3*).—In 1931, 20 trees of Valencia orange worked on Eureka lemon were set in an orchard near Valencia trees on sweet orange and on their own roots. The Eureka-rooted trees were much smaller in size, but appeared normal in leaf color and fruiting habits. Studies upon the composition of the fruit and juice showed the Eureka lemon-rooted trees to produce fruit with a lower percentage of total solids and acid, a higher solids to acid ratio, and a thicker rind, but an equal amount of juice in the edible portion of the fruit.

Effects of growth-regulating substances on a parthenocarpic fruit, H. E. Clark and K. R. Kerns. (Pineapple Res. Inst. Hawaii). (*Bot. Gaz., 104 (1943), No. 4, pp. 639–644, illus. 2*).—This experiment was conducted with the Cayenne variety, in which normal floral differentiation occurs about 14 mo. after planting. Relatively high concentrations of α-naphthaleneacetic acid applied after normal differentiation had taken place caused a marked increase in the size and weight of ripe fruit, although the number of fruitlets was not influenced by any of the treatments. The increase in growth was accompanied by the development of large peduncles, from which the fruit was separated with some difficulty. The highest concentrations of the acid delayed ripening and, particularly when applied to the center of the plant, inhibited partially the growth of slips and suckers. Relatively low concentrations of acid caused some stimulation of the growth of dormant slip buds, resulting in a larger number of slips per plant.

Influence of sod and other factors upon the distribution of small tung roots in Ruston sandy loam, O. A. Leonard. (Miss. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 11–16*).—A study of factors affecting the distribution of small roots of tung trees growing in Ruston sandy loam showed the roots to be more concentrated near the surface in the case of sod than under cultivated trees. The sod tended to reduce the number of roots in a given volume of soil. Small roots had a fairly uniform horizontal distribution up to 6 ft. from the trunk and were abundant 10 ft. distant, especially under cultivation. Roots were more abundant in surface black soil than in tan or reddish soils. Abundant small roots were found in the subsoil near where old forest trees had been burned or decayed. Most of the large roots were located 18 in. or deeper in the soil. Since the subsoil was very deficient in available N and P, the author concludes that the lack of these elements probably accounts for the limited root development in the subsoil.

Mulch versus cultivation in the young tung orchard, J. H. Painter and G. F. Potter. (U. S. D. A.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 17–20*).—In a tung orchard planted in January 1940, certain trees were mulched with *Crotalaria spectabilis* and weeds in the summers of 1940, 1941, and 1942. Both the mulched and the unmulched rows were disked about 6 ft. on each side of the row three or four times each year. All trees were fertilized alike. Measurements in November 1942 showed the mulched trees had averaged 13.6 ft. in height, 17.8 ft. in spread, and 30.9 cm. in trunk girth as compared with 11.0 ft., 14.2 ft., and 22.4 cm., respectively, for the cultivated trees. The average yields in 1942 were 10.8 and 4.6 lb. per tree, respectively. There was some evidence that mulching had reduced the prevalence of K-deficiency symptoms on the leaves.

Copper deficiency of tung trees, M. Drosdoff and R. D. Dickey. (U. S. D. A. and Fla. Expt. Sta.) (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 79–84, illus. 2*).—An abnormal foliage condition characterized by a "cupping" of the terminal leaves, which were unusually small and showed interveinal chlorosis and tip and marginal burning, was corrected by applications of copper sulfate solution to the soil or by spraying the tree with the same material. The trouble was observed in a number of orchards in north-central Florida, and in one bearing orchard near Morriston it was estimated to have affected over 100 acres of trees.

Ascorbic acid content of walnut hulls, E. Hansen. (Oreg. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 265–266*).—A high content of ascorbic acid was found in the hulls of Persian, eastern black, and California black walnuts at the approach of maturity. On a fresh-weight basis, the values compared favorably with those reported for rose hips. On a dry-weight basis, the hulls were much richer in ascorbic acid, since they contained from 86 to 90 percent of water as compared with from 40 to 50 percent in the rose hips.

Bibliography and collected abstracts on rubber producing plants (other than species of Hevea), A. I. Moyle (*Texas Sta. Cir. 99 (1942), pp. 228*).—This bibliography was compiled to aid growers and scientific workers who are interested in the development of supplies of rubber, particularly during the present emergency.

Divi-divi offers tannin, E. R. Burkland (*U. S. Dept. Agr., Off. Foreign Agr. Relat., Agr. in Americas, 3 (1943), No. 8, pp 154–156, illus. 2*).—The pods of *Caesalpinia coriaria*, a species commonly known as dividivi, are said to be promising as a source of tannin. The pods contain from 40 to 50 percent of tannin, of which 25 percent is insoluble matter, 18 percent soluble nontannins, and 13 percent moisture. The past and potential uses of the material as a source of tannin are discussed.

Plants for insecticides and rodenticides, A. F. Sievers and E. C. Higbee (*U. S. Dept. Agr., Off. Foreign Agr. Relat., Foreign Agr. Rpt. 8 (1943), pp. 20+*).—Information is given on the habits of growth, climatic and cultural requirements, methods of harvesting, and commercial importance of the various plants in the world trade.

Care of azaleas and camellias during summer, F. S. Batson (*Miss. Farm Res.* [*Mississippi Sta.*], *6 (1943), No. 6, pp. 3, 8*).—Information is given on watering, fertilization, pruning, and spraying.

Effects of defoliation on cold resistance and diameter growth of broadleaved evergreens, P. J. Kramer and T. H. Wetmore (*Amer. Jour. Bot., 30 (1943), No. 6, pp. 428–431*).—Observations at Durham, N. C., on the winter hardiness of six species of broadleaved evergreens, the leaves of certain plants of which were removed in October and in April with untreated plants as controls, showed that autumn defoliation was disastrous, with most of the plants killed outright during the succeeding winter. *Elaeagnus* was somewhat of an exception, with three of the autumn-defoliated plants surviving two successive defoliations in good condition. Spring defoliation was not as harmful, with all plants surviving the following winter in excellent condition but with some making less diameter growth than the controls. Apparently broadleaved evergreens are dependent on the overwintering leaves for carbohydrates. That the old leaves aid in supplying food in the summer was shown by the reduced diameter growth of some of the spring-defoliated plants.

Some interrelationships of growth, salt absorption, respiration, and mycorrhizal development in Pinus echinata Mill., J. B. Routien and R. F. Dawson. (Univ. Mo.). (*Amer. Jour. Bot., 30 (1943), No. 6, pp. 440–451, illus. 2*).—Under conditions of controlled moisture and nutrient supply, it was found that substantial growth and salt uptake are possible at the higher levels of base saturation of the soil in the absence of mycorhizas, provided the physiological balance of the soil nutrients is maintained. In the presence of mycorhizas the plants are enabled to continue normal growth and salt absorption or even to surpass the normal rates in the presence of considerable amounts of adsorbed H-ion. The development of mycorhizas increased the average rate of aerobic CO_2 production of each short root from nearly two to four times the normal amount, depending upon the degree of such development. The authors suggest that the presence of mycorhizas increases the salt-absorbing capacity of the roots primarily by adding to the supply of exchangeable H-ion derived in part at least from carbonic acid.

FORESTRY

Timbers of the New World, S. J. Record and R. W. Hess (*New Haven: Yale Univ. Press; London: Humphrey Milford, 1943, pp. 640+, illus. 66*).—This comprehensive textbook is the successor to Timbers of Tropical America (E. S. R., 52, p. 345). Arranged alphabetically by families, it presents information on geographical distribution, growth habits of the trees within the species, the characteristics and value of their wood, potential uses as sources of various forest products such as rubber, resin, oils, etc.

Forestry in New England, H. I. BALDWIN (*Natl. Resources Planning Bd., Region 1, Pub. 70 (1942), pp. 57+, illus. 14*).—This preliminary edition, issued in mimeographed form, contains information on the present character and extent of New England forests, volume of standing timber, forest ownership, present use of forest resources, a plan that would conserve and develop New England forests, etc.

Studies in tolerance of New England forest trees.—XIV, Effect of spacing on the efficiency of white and red pine needles as measured by the amount of wood production on the main stem, G. P. BURNS and E. S. IRWIN (*Vermont Sta. Bul. 499 (1942), pp. 28, illus. 12*).—In this fourteenth paper (E. S. R., 77, p. 789) the authors discuss observations in plantations established in 1913 and cut in 1941. The trees were studied with special reference to the effect of spacing on needle efficiency as measured by the amount of wood produced in the main stem. The average diameters at breast height of red and white pines spaced 4 by 4 ft. exceeded those of trees spaced 2 by 2 ft. by 48 and 16 percent, respectively. Highly significant correlations were established between main stem increments and needle development. The efficiency of the needle surface areas on the 4 by 4 spaced red and white pines exceeded that of the 2 by 2 spaced trees by 48 and 16 percent, respectively. At the 2 by 2 ft. spacing, needle efficiency was much the same for the two species, whereas in the 4 by 4 ft. spacing the red pine was slightly more efficient than white pine. The needle surface areas on red and white pines growing on an acre of land and spaced 2 by 2 and 4 by 4 ft. were, respectively, 22 and 41 acres and 14 and 16 acres.

Hardwood invasion in pine forests of the Piedmont Plateau, L. I. BARRETT and A. A. DOWNS (U. S. D. A.). (*Jour. Agr. Res. [U. S.], 67 (1943), No. 3, pp. 111–128, illus. 10*).—Sample stands within a random selection of 40 Piedmont counties in the Carolinas and Virginia were studied. On areas which had not been burned for at least 10 yr. there was a tendency in both loblolly and shortleaf pine stands for the proportion of the climax species, oaks and hickories, to increase in the hardwood understories with an increase in the age of the pine overwood. In shortleaf pine stands, the amount of pine reproduction per acre decreases significantly as the overstory grows older, but under loblolly pine it tends to remain approximately constant for all ages of the overstory. In both the loblolly and shortleaf pine stands the amount of understory pine reproduction per acre decreases with increasing density of the overwood, but increases with the improvement in the site index. Climax oaks and hickories represent only a part of the entire hardwood understory of both shortleaf and loblolly pine stands.

In shortleaf pine stands burned over at least once in the last 10 yr., understory climax hardwoods were present in about half the amount found in unburned stands. Understory pine reproduction in burned shortleaf pine stands showed a marked increase with the advancing age of the overstory, opposite to the trend in unburned stands. Climax hardwoods in the understories of loblolly pine stands showed the same trend as those in unburned stands. Pine reproduction was reduced in the burned loblolly stands, and the pine understory had no consistent relationships with overstory density and site.

Georgia forest resources and industries, A. R. SPILLERS and I. F. ELDREDGE (*U. S. Dept. Agr., Misc. Pub. 501 (1943), pp. 70+, illus. 16*).—A description is presented of the survey units, and information is given on the prevailing social and economic situation, the condition of the forests, volume estimates of saw timber and other materials, naval stores resources, and present drain on the forests. Recommendations are presented for the rehabilitation of Georgia's forest resources. Detailed factual information is presented in the appendix.

Louisiana forest resources and industries, R. K. WINTERS, G. B. WARD, JR., and I. F. ELDREDGE (*U. S. Dept. Agr., Misc. Pub. 519 (1943), pp. 44+, illus. 31*).—An inventory is given of the forest lands and resources of Louisiana, including descriptions of the forests, economics of the forest situation, forest industries, increment and drain, and ways and means of perpetuating the forests. Tabulated data are presented in the appendix.

DISEASES OF PLANTS

The Plant Disease Reporter, [July 1–15, 1943] (*U. S Dept. Agr., Bur. Plant Indus., Soils, and Agr. Engin., Plant Disease Rptr., 27 (1943), No. 12–13, pp. 233–259, illus. 2*).—The following are included: Reduction in the yield of celery caused by the root knot nematode, by G. K. Parris; root knot nematode on lima beans in Maryland, by G. K. Parris and R. A. Jehle; control of root knot by summer plowing, and nematodes on potatoes and lettuce in New York; progress of potato late blight; late blight of potatoes in New York State during 1942, and potato late blight in Kentucky in 1942; potato diseases in the Hastings section of Florida this season, by A. H. Eddins; decay in early potato shipments, by F. Weiss; canning pea diseases in Wisconsin in 1943, by W. W. Ware; dead arm disease of grape in Illinois, by H. W. Anderson and A. S. Colby; winter injury and diseases of fruit crops in New Hampshire, by M. C. Richards; fruit diseases reported from Pennsylvania, by R. S. Kirby; root rots of Gramineae in the Northern Great Plains, 1940–43, by R. Sprague; wheat and barley scab in Pennsylvania, wheat scab in Ohio, and scab and glume blotch on wheat in Illinois; organized seed treatment to improve stands and conserve seed a part of the Government's wartime hemp program, by R. J. Haskell, R. W. Leukel, and C. J. Otten; rhododendron dieback and canker, by F. Weiss; diseased maples in Massachusetts, by M. A. McKenzie; and brief notes on unusual occurrences of some vegetable diseases, virus disease of red currants in Ohio, strawberry red stele in New York, wheat diseases in Pennsylvania, wheat flag smut in the State of Washington in 1943, report on survey trip relative to barley and oats diseases through upper Sacramento Valley, Calif., bacterial wilt of sweet corn in Pennsylvania, ash rust (*Puccinia peridermiospora*) in New England, powdery mildew on *Doronicum plantagineum* in California, and tobacco black shank in Virginia.

Twenty-second annual report of the Canadian Plant Disease Survey, 1942, I. L. CONNERS and D. B. O. SAVILE (*Canada Dept. Agr., Sci. Serv., Plant Disease Survey Ann. Rpt., 22 (1942), pp. 110+*).—The same general plan is followed as in previous reports (E. S. R., 87, p. 807).

Indice preliminar de las principales enfermedades y plagas de la agricultura en el Ecuador [Preliminary list of the principal diseases and pests of agriculture in Ecuador], E. MOLESTINA O. (*Bol. Dept. Agr. Ecuador*], *No. 15 (1942), pp. 25, illus. 3*).—An annotated list of diseases and insects attacking crop plants.

La flora fungosa Peruana: Lista preliminar de hongos que atacan a las plantas en el Peru [Fungus flora of Peru: A preliminary list of fungi attacking plants in Peru], G. GARCÍA RADA and J. A. STEVENSON (*Lima, Peru: Estac. Expt. Agr. Molina, 1942, pp. 112*).

The diagnosis of mineral deficiencies in plants by visual symptoms: A colour atlas and guide, T. WALLACE (*London: Govt., 1943, pp. 116+, illus. 114*).—A series of color photographs shows the appearances characteristic of different deficiencies in a wide range of horticultural and field crops commonly grown in Great Britain, and a method devised by the author for diagnosing particular deficiencies from the changes produced in a selected series of indicator plants is presented. The text chapters consider the essential points in the nutrition of plants, soils in relation to the supply of mineral elements, methods of determining mineral deficiencies in crops, visual symptoms of deficiencies, and the use of the visual method of diagnosis in the field. Tabulated guides to deficiencies and to suitable indicator plants, and a subject index are provided.

Las Cercospora de Venezuela, A. S. Müller and C. Chupp (*Bol. Soc. Venez. Cien. Nat., 8 (1942), No. 52, pp. 35–59*).—An annotated list of the 176 *Cercospora* species reported from Venezuela and their hosts, including descriptions of 30 new species of these leaf spot fungi.

A quantitative study of chlorosis in Chlorella under conditions of sulphur deficiency, G. R. Mandels. (Cornell Univ.). (*Plant Physiol., 18 (1943), No. 3, pp. 449–462, illus. 10*).—The development of chlorosis and the process of recovery were analyzed in *Chlorella* grown under controlled conditions in S-deficient cultures, and the chlorophyll deficit of chlorotic cells was put on a quantitative basis and expressed as a percentage of the normal chlorophyll content. The S-deficiency chlorosis was found to develop in two phases due, respectively, to: (1) A differential between the rates of cell division and of chlorophyll synthesis as they both decline to zero, resulting in a decrease in the amount of chlorophyll per cell before cell division stops; and (2) slow decomposition of chlorophyll in the nondividing cells. Instead of starch, fat accumulates in the deficient cells. Addition of sulfate to deficient cells resulted in rapid recovery from chlorosis. Although chlorophyll synthesis was evident within about 5 hr., cell division did not occur until about 24 hr. after sulfate was added. Chlorophyll formation occurred at a lower sulfate concentration than did cell division. The curve showing chlorophyll formation during recovery can be separated into four stages, viz, (1) a lag period of about 5 hr. between sulfate addition and chlorophyll synthesis; (2) a period of accelerated chlorophyll synthesis during which the rate increases from zero to a maximum over a period of about 5 hr.; (3) a period of logarithmic increase in chlorophyll at a rate faster than during the normal growth in full nutrient solution; and (4) a period of decrease in rate of synthesis. Also studied were the effects on recovery of light v. darkness, initial degree of chlorosis, concentration of sulfate, sources of organic and inorganic S available, and the necessity of O_2. The chlorophyll yield during recovery was constant over the concentration range 0.01–1.93 p. p. m. of S as sulfate, about 0.34 mole of chlorophyll being formed per mole of sulfate added. It is inferred that complete absorption of sulfate occurs.

Thiamine in crown gall as measured with the Phycomyces assay, B. W. Henry, A. J. Riker, and B. M. Duggar. (Wis. Expt. Sta.). (*Jour. Agr. Res. [U. S.], 67 (1943), No. 3, pp. 89–110, illus. 2*).—According to the *Phycomyces* assay, using tomato, sunflower, and marigold plants, thiamin accumulated in almost maximum concentration at inoculation points within a week after treatment. Its concentration in galls remained fairly constant 3–5 weeks after inoculation (period of rapid size increase), approached that in the growing tip of the host, was somewhat greater than in mature leaves, and was much greater than that in mature stems of either inoculated or control plants. Temperatures above (32° C.) and below (28°) the maximum for gall formation on tomato had no apparent effect on the thiamin concentration in inoculated plants. Galls incited by a partly attenuated culture of *Phytomonas tumefaciens* contained as high a concentration of thiamin as those induced by a virulent culture, and the cells of the former culture contained as much thiamin as those of the latter. Thus thiamin may aid in initiating crown gall, but it apparently has no causal role in gall development beyond that of any necessary food or growth factor.

The taxonomy, host range, and geographic distribution of the genus Pythium, J. T. MIDDLETON (*Mem. Torrey Bot. Club, 20 (1943), No. 1, pp. 171, illus. 17*).—In this monographic contribution "an attempt is made to assemble information from many scattered papers [over 24 pages of references] and indicate the salient parts. New data resulting from observation, research, and analysis are presented, and already existing data are amplified and evaluated." As many cultures as were available of the described species from various hosts and localities were secured for first-hand study. Keys for identifying the species were often found inadequate, and one utilizing the principles of a natural classification based on the morphology of the species seemed most desirable and is therefore supplied. As a further aid to students of the genus and to plant pathologists encountering members of the group as plant pathogens, information relative to host and geographic distribution is included. In addition to a summary and condensation of the available literature of this phase of the work, the extent and variety of hosts have been materially amplified, and this information is appended to the discussion of the individual species and cross-indexed for the reader's convenience.

Deterioration of the red rot fungus in culture, G. B. LUCAS. (La. State Univ.). (*La. Acad. Sci. Proc., 6 (1942), pp. 46–47*).—The evidence from single-spore and single-hyphal tip cultures presented suggests that the ability of *Colletotrichum falcatum* to produce spores is inherent in the fungus itself and that on a suitable medium it may be cultured indefinitely without deterioration.

Revisión de las especies de Tilletia de la Argentina, E. HIRSCHHORN (*Rev. Mus. La Plata, n. ser., 5 (1942), Bot., No. 18, pp. 1–20, illus. 6; Eng. abs., p. 20*).—From a study of abundant material from various parts of Argentina, the author redescribes the species reported in its flora, notes the morphological variability of *T. tritici* and its similarity to *T. secalis* and *T. triticina*, describes abnormalities in the promycelium of *T. tritici* and *T. levis*, and calls attention to the similarity of *T. hypsophila* to *T. hyalospora* and of *T. eremophila* to *T. muhlenbergia* and *T. dicipiens*. *Piptochaetium montevidensis* and *Muhlenbergia disticophila* are reported as new hosts, respectively, to *T. hypsophila* and *T. eremophila*, and *T. fusca patagonica* n. var. is described. A key to the species is provided.

A heritable abnormality in the germination of chlamydospores of Ustilago zeae, S. J. P. CHILTON. (Minn. Expt. Sta.). (*Phytopathology, 33 (1943), No. 9, pp. 749–765, illus. 2*).—Chlamydospores from certain crosses between single-spore lines of *U. zeae* germinated abnormally, developing gnarled and distorted promycelia that either autolyzed or irregularly produced a comparatively few sporidia. Extensive experiments indicated that the lysis was not due to an infectious agent of bacteriophage nature. The factor or factors for lysis were found to be carried in certain lines only, and segregation for factors affecting this character was demonstrated. As the lysis was restricted to the promycelium, the operation of factors for lysis and other abnormalities associated with it seemed to be restricted to the meiosis period. There was a definite tendency for production of unusually large numbers of solopathogenic (apparently diploid) sporidia by promycelia of chlamydospores resulting from crosses involving one or more haploid lines carrying the lytic factors. Solopathogenic lines grew normally, caused infection when inoculated singly, and in other ways behaved like similar lines described by others. Mutation occurred in solopathogenic as well as haploid lines. There was partial reversion to the normal germination type in the chlamydospores produced by some solopathogenic lines, as indicated by a decided decrease in the proportion of abnormal and disintegrating promycelia. When haploid sporidia produced by such "reverting" lines were crossed, it was evident that the recovery persisted. There was a correlation between abnormally large size of chlamydospores and their tendency to abnormal germination. This is unexplained but, according to Laskaris (E. S. R., 85, p. 67), occurs in *Sphacelotheca sorghi* also.

Elctron microscope studies of bacterial viruses, S. E. Luria, M. Delbrück, and T. F. Anderson (*Jour. Bact., 46 (1943), No. 1, pp. 57–77, illus. 18*).—Previous growth experiments (E. S. R., 88, p. 769) served to analyze the various stages of interaction (specific adsorption, latent period of virus multiplication, virus liberation, and lysis of the bacterium) and thus form the basis for interpreting the results. Four strains of bacteriophages have been studied with the electron microscope, and in all cases the virus particles could be identified on the micrographs. Three strains exhibited "sperm-shaped" particles consisting of a head and a tail; no tail was visible for the fourth. The particles of one of the viruses showed a distinct structure in the head. The particle sizes agreed well with the figures obtained by some of the indirect methods.

The interaction between virus and host was studied in detail for two viruses acting on the same strain of *Escherichia coli.* The micrographs demonstrate the adsorption of virus on the host and, after the predicted time, lysis of the host with liberation of virus particles of the infecting type. There was quantitative agreement between the numbers of particles visible on the micrographs and the numbers predicted on the basis of growth experiments for which plaque count assays were used. Along with the virus particles, the lysing cells shed protoplasmic material of uniform granular structure. The size of these granules was much smaller than that of the viruses and was independent of the virus causing the lysis. On lysis, the virus particles were liberated from the interior of the bacterial cell; they were not visible on its surface up to the moment of lysis. In cases of multiple infection, the infecting virus particles, or at least the majority of them, seemed not to enter the cell but to remain attached to the outside of the bacterial cell wall. The bearing of these results on problems of the nature of viruses and of their systematic position is discussed.

Evidence for the evolution of phytopathogenic viruses from mitochondria and their derivatives.—II, Chemical evidence, H. G. DuBuy and M. W. Woods. (Md. Expt. Sta.). (*Phytopathology, 33 (1943), No. 9, pp. 766–777, illus. 3*).—Continuing the series (E. S. R., 89, p. 549), a method for extracting the chromoprotein complex from plastids is presented, some conditions for occurrence of streaming birefringence therein are given, and, for comparison, some conditions for the presence or absence of stream' birefringence of tobacco mosaic virus protein are also included. The resemblance of the chromoprotein complex to the complex as it occurs in vivo is demonstrated by analysis of the spectral absorption of extracts and living leaves and by some of its chemical and physical properties. Various reactions characteristic of ribose nucleoprotein are given by a protein fraction of the chromoprotein complex of purified plastids of *Nicotiana tabacum.* Some evidence for the evolution of plant virus nucleoproteins from the plastid nucleoproteins is presented, suggesting the possibility of a similar evolution of certain animal viruses from mitochondria and a parallelism of variegation-inducing plastids and cancer-inducing mitochondria.

Metabolic phenomena associated with virus infection in plants, F. L. Wynd. (Univ. Ill.). (*Bot. Rev., 9 (1943), No. 7, pp. 395–465*).—This comprehensive review (146 references) includes the virus infection phenomena in plants associated with respiration; carbohydrate, nitrogen, and mineral metabolism; water relationships; and changes in miscellaneous substances. From his analysis presented, the author concludes that there are two major physiological effects in such infections which he summarizes as follows: "Respiratory activities are markedly increased very early during the course of the infection which corresponds to the period of arrival of virus particles from points of infection. The plant recovers from this initial shock, although the quantity of virus protein continues to increase. The permeability of cytoplasm or its membranes is greatly altered in respect to soluble substances. This accounts for the accumulation of carbohydrate in the leaves and the accumulation of nutrient ions in the roots at the expense of tops. Since the changes in permeability vary for different ions, the nutritional state of the plant is more significantly disturbed than the general reduction of the total ash would suggest."

Die Phytopharmazie im Dienste der Landwirtschaft [Phytopharmacy in the service of agriculture], C. HADORN (*Schweiz. Apoth. Ztg., 80 (1942), No. 39, pp. 521–526*).—A general discussion of plant disease control by chemical means.

Bordeaux injury to foliage at low temperatures, C. E. YARWOOD. (Univ. Calif.). (*Plant Physiol., 18 (1943), No. 3, pp. 508–516, illus. 2*).—In a field of potatoes apparently injured by frost, it was noted that bordeaux-sprayed vines were more severely injured. In greenhouse tests, bordeaux spray increased the water loss from beans at 0°–37° C., decreased leaf temperatures of beans and potatoes by as much as 3.6°, and injured bean, potato, cucumber, and cantaloup foliage at 0°. Unsprayed cantaloup plants were injured by exposure to 0°–2°, but bordeaux-sprayed plants were more severely damaged. Control and bordeaux-sprayed cantaloup plants exposed to 20°–34° showed no marked bordeaux or temperature injury, and those exposed to 40° were injured by temperature but not by bordeaux. Cabbage plants showed no bordeaux or temperature injury from exposures to 0°–40°. It is believed that the increased transpiration and decreased leaf temperature resulting from the spray were associated with the bordeaux injury to foliage at low temperatures.

Copper spray substitutes, A. E. DIMOND, J. W. HEUBERGER, and J. G. HORSFALL. (Conn. [New Haven] Expt. Sta. coop. Univ. Nebr.). (*Amer. Potato Jour., 20 (1943), No. 6, pp. 141–153*).—The results of experiments by the authors and others with new types of fungicidal materials are surveyed. A number of these appear useful as Cu substitutes both for seed protectants and foliage sprays. At present three of them are in production and capable of controlling disease, viz, Spergon, Thiosan, and Fermate, all having shown excellent results in the field on a number of crops. A number of other organic compounds and some Cu salts of organic compounds have given promise under field conditions, but they are not on the market or have been insufficiently tested for large-scale use. Shortcomings of the Cu substitutes are their high cost, limited production, high specificity, and low tenacity (resistance to weathering). Methods of surmounting these difficulties are discussed.

Fungi tolerant to extreme acidity and high concentrations of copper sulfate, R. L. STARKEY and S. A. WAKSMAN. (N. J. Expt. Stas.). (*Jour. Bact., 45 (1943), No. 5, pp. 509–519, illus. 5*).—Of two cultures isolated from acid solutions (pH 0.2–0.7) containing 4 percent $CuSo_4$, one was closely related to the *Cephalosporium* group and identified as *Acontium velatum* and the other, a dark green fungus, belonged to the Dematiaceae but was not definitely identified. Both were tolerant to extremely high concentrations of H ions and to $CuSO_4$, growing well in a synthetic medium at pH 0.3–1 and making a limited development at pH 0.1, and the green fungus also grew at pH 0. Both fungi also grew in media saturated with $CuSO_4$, although they grew better in its absence. They developed well in saturated solutions of this salt, at pH 2–0.3, and produced some growth at about pH 0. It is believed that this tolerance combined with resistance to high concentrations of $CuSO_4$ is the highest yet recorded for any living organism.

Spergon trials, W. Ketron (*West. Canner and Packer, 34 (1942), No. 12, pp. 19–21, illus. 1*).—A discussion of the generally favorable results from seed treatment of peas and beans with Spergon and of the striking results in emergence and stand from such use on lima beans in California during the 1943 poor-germination spring.

The genus Phaeoseptoria on grasses in the Western Hemisphere, R. Sprague. (Oreg. Expt. Sta. coop. U. S. D. A.). (*Mycologia, 35 (1943), No. 4, pp. 483–491, illus. 2*).—Seven species or varieties, all involving new taxonomy, are described, with keys to the genus and the forms included.

Sclerotinia caricis-ampullaceae, a remarkable sub-arctic species, H. H. Whetzel and W. G. Solheim. (Cornell Univ. and Univ. Wyo.). (*Mycologia, 35 (1943), No. 4, pp. 385–398, illus. 6*).—Discovered and first described in Finland, this fungus parasite of *Carex* was recently found in a high mountain swamp in Wyoming. A translation of the original description, accounts of the discovery of the fungus in the United States and of its life history, and a fuller technical description (including its taxonomic relationships and distribution) are presented.

Mustard oils in crucifers and their relation to resistance to clubroot, M. A. Stahmann, K. P. Link, and J. C. Walker. (Wis. Expt. Sta. and U. S. D. A.). (*Jour. Agr. Res.* [*U. S.*], *67 (1943), No. 2, pp. 49–63, illus. 1*).—A biochemical study was made of the isothiocyanate content of root tissue as related to species and varietal resistance in the crucifers to invasion by *Plasmodiophora brassicae*. β-Phenethyl isothiocyanate was isolated from root tissue of resistant and susceptible strains of turnip and black mustard (*Brassica nigra*) and from susceptible strains of white mustard (*B. alba*) and horseradish. This appears to be the principal mustard oil in the root tissue of many crucifers, whether susceptible or resistant to clubroot. Previous methods for estimating mustard oil gave variable recoveries when applied to the estimation of isothiocyanates produced by enzymatic hydrolysis of a mustard-oil glycoside. Improved analytical methods for estimating them were developed and applied to a study of (1) the enzymatic hydrolysis of sinigrin, (2) the isothiocyanate content of turnip and mustard root tissue as it relates to resistance to clubroot, and (3) the thioglucosidase (myrosin) activity of resistant and susceptible root tissues. Quantitative estimation of the total mustard-oil content and the relative myrosin activity of root tissues failed to show any correlation of isothiocyanate content or thioglucosidase activity with resistance or susceptibility to clubroot. It thus appears that the mustard oils are not essential for preventing or retarding clubroot development in the root tissues of crucifers. There are 33 references.

Fungi reported on species of Medicago, Melilotus, and Trifolium, S. J. P. Chilton, L. Henson, and H. W. Johnson. (Coop. La. State Univ., Ky. Expt. Sta., et al.). (*U. S. Dept. Agr., Misc. Pub. 499 (1943), pp. 152*).—This contribution, bringing together the scattered information on the fungi reported on these important genera of forage legumes, includes a host index, an alphabetical list of the fungi with synonyms, and a list of over 1,700 pertinent references selected from a total of 3,000 and entered alphabetically by authors. In most cases the original publications were checked.

Wheat varietal reaction to dwarf bunt in the western wheat region of the United States, C. S. Holton and C. A. Suneson. (U. S. D. A. and Wash., Idaho, Utah, and Mont. Expt. Stas.). (*Jour. Amer. Soc. Agron., 35 (1943), No. 7, pp. 579–583*).—The reactions of 52 varieties and hybrid selections of winter wheat to dwarf bunt (a race of *Tilletia tritici*) in this area were determined by nursery tests in five localities in the States of Washington, Idaho, Utah, and Montana. Smut-free seed was sown in soil presumed to be contaminated with the bunt spores. Infection apparently cannot be accomplished by seed inoculation. Of the 52 varieties, 31 (including Relief, Rex, Requa, Hymar, Minturki, Albit, and Ridit) had less than 10 percent dwarf bunt, indicating ample highly resistant stock for breeding purposes. The highest infections were obtained at Logan, Utah, and the lowest at Troy, Idaho.

Influence of temperature on the infection of wheat by the powdery mildew Erysiphe graminis tritici, R. PRATT (*Bul. Torrey Bot. Club, 70 (1943), No. 4, pp. 378–385, illus. 2*).—Under a 12-hr. daily illumination from a 1,000-w. Mazda lamp and high relative humidity, infection by *E. graminis tritici* occurred at from —2° to 25° C., with the optimum at 20°. No macroscopically visible signs of infection were observed above 25°. The spores suspended in tap water germinated readily at from —2° to 30°, with the optimum for both germination and germ-tube growth at 20°. Failure to become infected at 30° was due to inability of the young mycelium to tolerate this high temperature.

An outbreak of common root rot in southwestern Saskatchewan in 1942, B. J. SALLANS and R. J. LEDINGHAM (*Sci. Agr., 23 (1943), No. 10, pp. 589–597, illus. 4*).—From this study it appears that the conspicuous disease affecting considerable areas in many wheat fields of this district was an aggravated form of common root rot, due principally to *Helminthosporium sativum* and also possibly certain other fungi such as *Fusarium* spp. The prematurely ripened, stunted, and discolored plants from the affected areas yielded about half as much grain as the normal areas, and the weight per 1,000 kernels was reduced about 28 percent by the infection. Possible relations of weather to the severe outbreak are discussed.

Rhizoctonia solani associated with a root rot of cereals in Norfolk, W. A. R. DILLON WESTON and S. D. GARRETT (*Ann. Appl. Biol., 30 (1943), No. 1, p. 79*).—Attention is called to partial failures of cereal crops in this locality of England, most frequently reported for barley but also for wheat and oats. The killing short of the first-formed crown roots was the most obvious effect on the root system; the fungus was never observed to infect the stem.

¿Ataca también la sigatoka al maiz? [Does the sigatoka disease also attack corn?], M. PACHECO H. (*Rev. Agr. [Guatemala], 20 (1943), No. 1–2, pp. 18–20, illus. 4*).—A note on a corn disease in Guatemala said to resemble *Cercospora musae* infection of plants of the banana family but identified as *Helminthosporium turcicum* leaf blight. Other diseases of the grass family are briefly referred to.

Cotton seed treatment for stand improvement, D. C. NEAL (Coop. U. S. D. A.). (*Louisiana Sta., Northeast Louisiana Sta. Bien. Rpt. 1941–42, pp. 32–40*).—The results of cottonseed treatment tests at the Baton Rouge and St. Joseph stations (1936–41) are believed to justify the following conclusions: Regular ginned (fuzzy) seed should be treated with Improved Ceresan (1.5 oz. per bushel) or Ceresan (3 oz. per bushel); with delinted seed the amounts may be reduced (1 and 2.5 oz. per bushel, respectively). Other dusts giving higher emergence of healthy seedlings than with untreated seed were Cuprocide, Spergon, and Spergonex. Commercial equipment that will clean, treat, and sack a large volume of seed per hour is said to be currently available. Reginning or machine delinting of cottonseed and delinting by H_2SO_4, followed by Ceresan dust treatment, usually resulted in better stands and more rapid germination than use of fuzzy stock. Precautions in the use of the poisonous mercury fungicides are given.

The prevention of seed-borne diseases of flax by seed disinfection, A. E. Muskett and J. Colhoun (*Ann. Appl. Biol., 30 (1943), No. 1, pp. 7–18, illus. 5*).—Mainly considered in this study (1939-41) were the seed-borne infections by *Polyspora lini* and *Colletotrichum lini*. A laboratory technic was devised for evaluating disinfectants within a period of a week at any time during the year. Organic mercury dusts proved ineffective unless used at excessive dosages, but used with water or separated milk good results were obtained. A proprietary fungicide containing tetramethyl thiuram disulfide gave almost complete control of *C. lini* and some control of *P. lini*. Formaldehyde proved to be phytocidal when used at effective dosages, whereas cuprous oxide was noneffective. Results by the fall of 1940 led to the decision to disinfect with Nomersan all flaxseed produced in Northern Ireland for the 1941 sowing; adoption of this scheme is being continued.

The pasmo disease of flax in Kenya (Sphaerella linorum Wollenweber), R. M. Nattrass (*East African Agr. Jour., 8 (1943), No. 4, pp. 223–226, illus. 4*).

Some modern aspects of potato production, W. Black and G. Cockerham (*Highland and Agr. Soc. Scot. Trans., 5. ser., 55 (1943), pp. 37–53*).—This is a general paper on potato production with particular reference to Scotland, laying emphasis on virus diseases and varietal reactions to them, *Phytophthora infestans* late blight, tuber storage and storage diseases, sprouting and cutting of tubers, and potato varieties.

Studies in seed potato treatments: Testing and adjusting corrosive sublimate solutions, I, II, L. E. Gilmore and C. H. Robinson (*Sci. Agr., 23 (1943), No. 11, pp. 676–687*).

I. *Laboratory control method* (pp. 676–681).—A simple control test was developed to check the $HgCl_2$ concentration at the initial and successive seed potato batch treatments in order to adjust the solution to effective strength. An aliquot of 100 cc. of the $HgCl_2$ solution, between 1:1,000 and 0.5:1,000, in the presence of a weak starch solution, is titrated against a test solution containing 5 gm. KI and 0.5 gm. $CuSO_4 5H_2O$ until a blue color appears. The tritration result is referred to a formula or table to obtain the amount of 5-percent $HgCl_2$ stock solution required to adjust the treatment solution to 1:1,000 on a 5-l. or a 5-gal. solution basis or multiples thereof.

II. *Field control method* (pp. 682–687).—A list of precautions is outlined for successful treatment of seed potatoes with $HgCl_2$ solutions, and instructions are given for preparing the treatment solution from a 5-percent stock solution, for the seed treatment procedure, and for testing and adjusting of solutions to insure effective control of tuber-borne diseases (*Rhizoctonia*, scab, and blackleg). The test is designed for use on the farm and consists of a simple titration with 100 cc. graduate. The $HgCl_2$ treating solution is added to 10 cc. of a test solution and 10 cc. of a 0.2-percent starch solution until the blue color disappears. The graduate reading is referred to an adjustment table to determine the correct amount of stock solution needed to mix with every 25 gal. of treatment solution to bring the strength to 1:1,000.

Patogenicidad de algunas cepas del Verticillium albo-atrum Rei. y. Berth. [Pathogenicity of some strains of V. albo-atrum], F. Mujica R. (*Bol. Sanid. Veg. [Chile], 1 (1941), No. 2, pp. 7–20, illus. 6*).—The 10 strains studied were classified into three groups according to their pathogenicity to potato plants and their vigor of growth in pure culture, viz, (1) definitely pathogenic and with vigorous growth in culture, strains from *Rosa* sp. and *Solanum melongena;* (2) weakly pathogenic strains from *Koelreuteria paniculata, Chrysanthemum* sp., *Acer platanoides*, and *Ulmus americana*, and also poor growth in culture except for the last two; and (3) nonpathogenic and with average growth in culture, strains from *Acer pennsylvanicum*, *Lonicera* sp., *Physalis* sp., and *Platanus* sp. The effect of temperature on the virulence of these strains for potato corresponded directly with their development in pure culture. The Irish Cobbler potato variety proved more or less susceptible to attack but Katahdin appeared to be immune. The results of the inoculation trials led to the conclusion that pathological specialization exists in this fungus species.

The Actinomyces of potato scab demonstrated by fluorescence microscopy, O. W. Richards (*Stain Technol., 18 (1943), No. 2, pp. 91–94, illus. 1*).—Like other acid-fast organisms, *A. scabies* can be selectively impregnated with carbol-auramin, following which it fluoresces a bright yellow on exposure to ultraviolet irradiation and thus permits ready localization and study of the micropathology of the tissue. This technic, done at room temperature and without counterstain, confirmed Lutman's conclusion (E. S. R., 85, p. 775) that the filaments are intercellular and grow within the middle lamellae. The detailed procedure is given.

Susceptibilidad de variedades de papas a la sarna polvorienta causada por la Spongospora subterranea (Wallr.) John [Susceptibility of potato varieties to powdery scab], F. Mujica R. (*Bol. Sanid. Veg. [Chile], 2 (1942), No. 1, pp. 17–19*).—The reactions of about 50 varieties are tabulated, infection ranging from over 60 percent down to a trace or none in several of the varieties tested.

An experiment on the physiological nature of spindling sprout, H. D. Michener (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 511–513*).—By the use of Russet Burbank potatoes from a source known to contain both spindling sprout and normal tubers, it was shown that spindling sprout stems increase in size when grafted onto normal stems. The most reasonable explanation for this is believed to be that the abnormal stems derive something from the normal stems which they otherwise lack. The spindling sprout tuber may therefore lack some substance necessary for normal growth or it may contain all necessary substances but lack the proper means of moving them to the growing stem.

Purple-top wilt of potatoes caused by the aster yellows virus, S. G. Younkin. (Cornell Univ.). (*Amer. Potato Jour., 20 (1943), No. 7, pp. 177–183*).—When a strain of aster yellows virus from *Ambrosia artemisiifolia* was transmitted to potato, the symptoms induced were similar to those of spontaneous purple-top wilt in the field, and the incidence of infection was related to the number of infective insects allowed to feed on the plants. Under controlled conditions, the varieties Rural and Katahdin proved more susceptible to the virus than Green Mountain. A virus was transmitted through grafts from spontaneously infected potato plants with purple-top wilt symptoms to *Nicotiana rustica*, and the recovered virus was then transmitted via *Macrosteles divisus* to aster, potato, and *N. rustica*, with resulting symptoms similar to those induced by known aster wilt virus.

Discussion on potato virus diseases (*Ann. Appl. Biol., 30 (1943), No. 1, pp. 80–108, illus. 11*).—This symposium includes the following papers: Potato Virus Diseases: Introduction, by G. Samuel (pp. 80–82); Some Properties of the Potato Viruses, by F. C. Bawden (pp. 82–83); Some Practical Difficulties in the Production of Virus-Free Seed Potatoes, by K. M. Smith (pp. 84–85); Some Factors Influencing the Health of Seed Potato Stocks in North Wales, by T. Whitehead (pp. 85–96); Ecology of Potato Aphides in North Wales, by I. Thomas and F. H. Jacob (pp. 97–101); The Life History of *Aphis* (*Doralis*) *rhamni* B. d. F. in Eastern England, by J. P. Doncaster (pp. 101–104); The Spread of Potato Virus Diseases in the Field, by P. H. Gregory (pp. 104–105); and Potato Breeding for Virus Resistance, by G. Cockerham (pp. 105–108).

Genetic variation in the clover leafhopper's ability to transmit potato yellow-dwarf virus, L. M. Black (*Genetics, 28 (1943), No. 3, pp. 200–209*).—By selective breeding through 10 generations, an "active" and an "inactive" race of *Aceratagallia sanguinolenta* were obtained. In the last generation, 80 percent of the active race, 2 percent of the inactive, and 30 percent of the hybrids proved infective under the same test conditions. Infective individuals appeared in every generation of the inactive race, even though all ancestors in preceding generations had failed to transmit the virus, and in every generation some individuals of the active race failed to transmit although all ancestors in preceding generations had done so. A slightly but significantly higher percentage of males (43 percent) than of females (38 percent) transmitted the virus. Although a difference between males and females was demonstrated to be significant only in the total population and in the active race, the difference was in the same direction in the inactive race and in the hybrids. Among the infectives, males were more efficient vectors than females, but such differences were significant only for the whole population and for the inactive race. Infectives in the active race were significantly more efficient vectors than infectives of the same sex in the inactive race. The hybrids were intermediate in efficiency, but in most cases their position was not demonstrated to be significant. The evidence indicated that males from crosses between inactive males and active females were more active than the females from such crosses and more active than the males and females from reciprocal crosses. Two genetic hypotheses explaining these differences are discussed.

Suggestions on inducing early germination of potato tubers in greenhouse tests for virus, F. E. Denny (*Amer. Potato Jour., 20 (1943), No. 7, pp. 171–176*).—Tuber samples from planting stock are commonly sent to Florida for field testing, but, being in the rest period, a uniform stand ordinarily cannot be obtained until 2–3 mo. after harvest. By the methods here described, the testing of recently harvested tubers can be begun in greenhouses within about a week after digging, and plants of suitable size for indicating symptoms of virus infection can be obtained within a month after treating and planting. The method detailed involves treatment of cut or whole tubers with ethylene chlorohydrin.

The resistance of potato varieties to Heterodera schachtii Schmidt, the potato-root eelworm, A. R. Gemmell (*Ann. Appl. Biol., 30 (1943), No. 1, pp. 67–70*).—The varieties Epicure and Doon Star permitted the development of fewer and smaller *H. schachtii* cysts on their roots than Golden Wonder and Majestic under standard conditions. Under the stimulus of root excretion the number of larvae emerging from cysts in the first two varieties was less than from a similar volume of cysts in the last two. Accepting Lapage's criteria of resistance to nematode infestation in animals (E. S. R., 78, p. 394) and applying them to plants, it is concluded that this deleterious effect of the variety on the pest is probably in the nature of a degree of resistance to nematode attack specific to each variety and is physiological rather than anatomical in its mechanism. Of the varieties tested, Epicure is judged most resistant, closely followed by Doon Star. Majestic proved fairly susceptible but not so much so as Golden Wonder.

Preliminary studies of a sorghum leaf-spot in Louisiana, D. C. Bain. (La. State Univ.). (*La. Acad. Sci. Proc., 6 (1942), p. 48*).—The parasite was tentatively identified as *Titaeospora andropogonis*. Apparently this disease is reported for the first time in the United States.

Studies on blackroot of sugar beet seedlings, A. A. Hildebrand and L. W. Koch (*Sci. Agr., 23 (1943), No. 9, pp. 557–567, illus. 1*).—Regardless of whether fertilizer had been added, black root (due to fungi for the most part residual in the soil) of seedlings was greater in cultivated soil than in that left undisturbed. Germination was poorest in cultivated soil without fertilizer and highest in that with added fertilizer. Black root was less prevalent in root-rot soil with a 2-16-10 commercial fertilizer applied in the row at 400 lb. per acre—half being placed in a band in contact with the seed and half in a band 1.5 in. below and a little to one side of the seed—than with no added fertilizer, regardless of whether the soil was cultivated. Seed treatment with Ceresan and Nomersan gave much higher germination than nontreatment and also considerable protection against pre-emergence damping-off but failed to protect the postemergence phase or to insure a profitable stand. Black root incidence was lower in root-rot soil with which cover crops of corn or soybean had been incorporated than in that sterilized by steam, and the seedling vigor in the soybean-treated soil was markedly greater than in any other series, including corn. When grown for 2 mo. in the greenhouse and then transferred to the field, all black root-infected seedlings recovered and developed into mature plants, giving an average yield only 15 percent below that of initially healthy seedlings.

Fertilizers in relation to the incidence of black root, H. C. Young. (Ohio Expt. Sta.). (*Sugar Beet Jour., 8 (1943), No. 11, pp. 212-218*).—As a result of field, greenhouse, and laboratory studies here summarized, it is claimed that black root of sugar beets can now be controlled by the following procedures: Use of ample manure or other organic matter to plow down; where severe, use of 400-500 lb. of superphosphoric acid (0-20-0) per acre in the row with the seed supplemented by plowing down nitrogen and potash, or a complete fertilizer (e. g., 2-12-6, 3-12-12, or 2-16-8) at the 300-400-lb. rate in the row below the seed; use of a seedbed in fine condition for the seed layer and not too compact below; and thinning and cultivating as soon as possible, without rolling or packing the soil after planting. Each of these steps is said to be important both for disease control and for the general good of the crop and the soil.

Differential inhibition between normal and tumor (crown gall) tissue in beet roots, M. Michaelis, I. Levi, and H. Hibbert (*Science, 98 (1943), No. 2534, pp. 89-90*).—A distinct difference was found in the action of resorcinol and of cyanide on the rate of O_2 uptake as between the tissues of normal beets and those of beet root tumors induced by inoculation with *Phytomonas tumefaciens*. Suggested interpretations of these results are given.

Treatment of sheared beet seed, L. D. Leach. (Univ. Calif.). (*U and I Cult., 3 (1943), No. 1, pp. 8, 29, illus. 1*).—Controlled tests are said to have shown that sheared seed can be effectively protected against *Pythium* and *Rhizoctonia* by treating with either of the organic mercurials Ceresan or New Improved Ceresan, but the seed should be planted within a few days to avoid injury.

Some observations on bacteria causing slime in cane juice, J. A. Alford and C. S. McCleskey (*La. Acad. Sci. Proc., 6 (1942), pp. 36-41*).—The organisms found in the cane juice belonged to the *Leuconostoc* group and consisted of at least three distinct types. It was also shown that *L. dextranicum* (not *L. mesenteroides*) is the principal gum former in sugar solutions. Of 125 strains of the latter form studied, none produced sufficient gum to solidify 15-percent sugar solutions, whereas all strains of the former were able to do so. Of the two types of *L. dextranicum*, one caused solidification of 15-percent raw sugar solutions but not of 15-percent commercial sucrose solutions, and a distinct fluorescence of the medium but no gas bubbles; the other type caused solidification of 15-percent commercial sucrose solutions but not of raw sugar solutions, and gas bubbles were present but no fluorescence.

A molestia das listas vermelhas [Red stripe disease of sugarcane], A. Caminha Filho (*Brasil Açucareiro, 20 (1942), No. 5, pp. 507–509, illus. 1*).—Notes on the disease associated with *Phytomonas rubrilineans* and *P. rubrisubalbicans* as it occurs in Brazil and varietal reactions to it.

Enfermedades del girasol [sunflower diseases], A. A. Sarasola (*Buenos Aires Prov. Dir. Agr., Ganad. e Indus., An. Rural, 10 (1942), pp. 111–122, illus. 3*).—Pertinent data, including symptoms, geographical distribution, hosts, and control, are presented for *Sclerotinia sclerotiorum* blight, *Albugo tragopogonis* white rust, and *Erysiphe cichoracearum* powdery mildew, and brief notes are given on minor troubles. There are 91 references.

Fusariosis del girasol (Helianthus annuus L.) [Fusarium infection of sunflower], L. V. Marengo (*Buenos Aires Univ., Rev. Facult. Agron. y Vet., 10 (1942), No. 1, pp. 130–147, illus. 9; Eng., Portug. abs., p. 145*).—Investigation of a sunflower disease occurring in an experimental field at Buenos Aires indicated it to be due to a *Fusarium* identified as *F. solani minus*. Inoculated plants developed damping-off symptoms within a week to a month after germination.

Stem and foliage scab of sweet potato (Ipomoea batatas), A. E. Jenkins and A. P. Viégas (*Jour. Wash. Acad. Sci., 33 (1943), No. 8, pp. 244–249, illus. 2*).—The history and distribution of the disease, originally reported from Formosa as due to *Sphaceloma batatas* (1931), are presented and the symptoms described. An ascomycete of the genus *Elsinoe*, discovered on cankers of stem and foliage scab from Campinas (Brazil), is regarded as the perfect stage and is described as *E. batatas* n. sp.

Precautions reduce dip injuries, R. H. Daines (*N. J. Agr. [Rutgers Univ.], 25 (1943), No. 3, p. 5*).—Experimental and observational evidence indicates that injury from organic mercury dips may be minimized by producing sweetpotato plants that are not too soft, avoiding too dry a soil by adequate watering at setting time, selecting favorable planting periods, and avoiding delays in planting after treatment.

Diseases of tobacco in 1942, L. W. Koch (*Canad. Hort. and Home Mag., 65 (1942), No. 9, pp. 220–222, illus. 3*).—Seasonal notes on the tobacco diseases in the Canadian Provinces of Ontario and Quebec.

Ensayos preliminares sobre control del damping-off del tabaco, S. Tartakowsky H. and A. García A. (*Bol. Sanid. Veg. [Chile], 2 (1942), No. 1, pp. 20–24*).—Preliminary results of seed and soil tests with various disinfectants are briefly reported. The principal causes cited are *Pythium debaryanum*, *Botryobasidium solani*, *Peronospora hyoscyami*, and *Botrytis cinerea*.

Influence of contact period on the passage of viruses from cion to stock in Turkish tobacco, C. W. Bennett. (U. S. D. A.). (*Phytopathology, 33 (1943), No. 9, pp. 818–822*).—The results of the series of graft inoculations reported clearly indicates that the viruses of ring spot and cucumber mosaic can be separated readily from the virus of curly top by taking advantage of the contact period required for passage of the respective viruses through the graft union. Furthermore, the first two viruses were often separable in short contact periods It is believed that these separations are due mostly to the difference in tissues in which the viruses are able to travel. Strong circumstantial evidence indicates that parenchyma-inhabiting viruses can move from cell to cell in the parenchyma through the plasmodesmata; this would permit the ring spot and cucumber mosaic viruses to move across the graft union as soon as a parenchyma union became available. The curly top virus, however, appears to be more or less limited to the phloem and it is known to be unable to move through at least certain types of parenchyma; it is therefore probably retained in the scion until phloem differentiation begins in the graft union.

On the basis of available information on graft transmission of "yellow" and "mosaic" types of viruses, it is believed that the mosaic types in general will be found transmissible by short contact periods between scion and stock. The data suggest that the graft technic might prove of considerable value in extending knowledge as to virus host range and in determining virus relationships in the case of those not juice-transmissible and for which insect vectors are unknown or have limited host ranges.

Should we treat vegetable seed? W. Crosier. (N. Y. State Expt. Sta.). (*Seed World, 53 (1943), No. 8, pp. 14–15, 22*).—A brief summary of experimental results with some of the newer seed protectants, with suggested treatments for eight common garden crops and weights of 16 protectants in teaspoonfuls per ounce presented in tabular form.

Productivity of mosaic-resistant Refugee beans, J. C. Walker and J. P. Jolivette. (Univ. Wis.). (*Phytopathology, 33 (1943), No. 9, pp. 778–788, illus. 3*).—By comparing the commercial stock of the susceptible Stringless Green Refugee variety with one in which the seed was virus-free, it was shown that common mosaic not only reduces the yield but distinctly alters the production rate. Four of the resistant varieties, Idaho Refugee, U. S. No. 5 Refugee, Sensation Refugee 1071, and Sensation Refugee 1066 were closely similar to the mosaic-free susceptible variety in both yield and production rate. The last was consistently earlier than all others in pod production at the canning stage. Wisconsin Refugee was distinctly later maturing than the other four resistant varieties and usually lower in total yield. Its production increased gradually to a peak late in the harvest period, in this respect resembling the susceptible variety with early mosaic infection. No significant differences of importance were found between the resistant varieties and the susceptible one as to pod shape and size, and all had equally high canning quality. All of the desirable characteristics of the original susceptible variety were apparently retained in the resistant forms. Among the last-mentioned is a range of maturity from that of the earliest, Sensation Refugee 1066, to the latest, Wisconsin Refugee. A variegation inherited from the resistant parent occurs in Wisconsin Refugee and Idaho Refugee, its expression being repressed by high air temperatures. Although it has had no significant influence on yield, it should be removed from these varieties by selection, since affected plants produce some distorted pods undesirable for processing.

Winter measures sweet corn wilt, C. M. Haenseler (*N. J. Agr. [Rutgers Univ.], 25 (1943), No. 3, p. 5*).—Attention is called to the rather close correlation over a 20-yr. period of decreases in bacterial wilt with increases in coldness of preceding winters in New Jersey. On the basis of these records it is believed that little trouble will be experienced during 1943.

Effect of seed treatment on emergence of peas, G. T. S. Baylis, R. S. Deshpande, and I. F. Storey (*Ann. Appl. Biol., 30 (1943), No. 1, pp. 19–26, illus. 3*).—Experiments over four seasons led to the conclusions that high soil moisture accentuates the preemergence damping-off of peas; a useful measure of disease control is obtained by treating the seed with red cuprous oxide or an organic mercurial, in either case without a sticker; whereas cuprous oxide has tended to exceed the mercurial in giving increased emergence, the latter in addition reduces the amount of seed-borne *Ascochyta* and is less liable to cause injury by overdosage; and adding a growth substance to the mercurial gives no increased benefit.

Controlling Ascochyta blight of pea, I–III, W. C. Snyder. (Univ. Calif.). (*Canning Age, 23 (1942), No. 13, pp. 681–682, 684, illus. 1; 24 (1943), Nos. 2, pp. 96–97; 4, pp. 204, 206*).

Estudio sobre la fisiología de la Phytophthora capsici Leonian productora del "mildiu o tizón" del pimiento en la Argentina [Study of the physiology of P. capsici causing blight of peppers], C. J. M. CABRERA (*Buenos Aires Univ., Rev. Facult. Agron. y Vet., 10 (1942), No. 1, pp. 156–198, illus. 18; Eng., Portug. abs., pp. 189–191*).—The author presents the results of an investigation of the pathogenicity of the fungus, the role of toxins in the wilting of the host, and the effects of pH, temperature, different media, organic acids, dyes and toxic substances, and various other chemicals on the growth of the pathogen.

Rhubarb wilt or crown rot (*Agr. Gaz. N. S. Wales, 54 (1943), No. 5, pp. 224, illus. 1*).—A first report for *Phytophthora parasitica* wilt of rhubarb in New South Wales.

Tomato seed treatments in relation to control of Alternaria solani, W. D. MOORE, H. R. THOMAS, and E. K. VAUGHAN. (U. S. D. A., Ind., N. J., Ga. Coastal Plain, and Ga. Expt. Stas., et al.). (*Phytopathology, 33 (1943), No. 9, pp. 797–805*).—Both liquid and dust seed treatments used tended to retard germination under high temperatures and medium to low rainfall. During two seasons of cool wet weather, final germination was improved significantly by organic mercury treatments, $HgCl_2$ also gave significant improvement in one of these seasons, and malachite green and Cuprocide dust were effective during the one season in which they were included. Except for one treatment (Ceresan plus Cuprocide) in 1939, seed treatments failed to reduce *A. solani* leaf spot or stem canker significantly in tests over 4 yr. Since the treatment mentioned caused no reduction in infection when tested in other years, it appears that the treatments here described are unlikely to reduce greatly the amount of infection in the tomato sections of southern Georgia.

Results of spraying watermelons with a copper fungicide, J. D. HARTMAN (Ind. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 585–589*).—Spraying with a mixture made up of a fixed copper fungicide (containing about 50 percent Cu), a commercial spreader, wheat flour, and water (1.5–0.4–8–100) increased the yields of No. 1 watermelons in southwestern Indiana, but at normal price levels the increase was enough to be profitable in only 1 of the 3 yr. under test.

Fruit diseases in 1942, W. D. MILLS. (Cornell Univ.). (*N. Y. State Hort. Soc. Proc., 88 (1943), pp. 118–124*).—A brief seasonal survey for orchard and small fruits in New York State.

[Fruit tree viruses in Washington State]. (U. S. D. A., Wash. Expt. Sta., et al.). (*Wash. Dept. Agr. Bul. 1–2 (1943), pp. [55], illus. 21*).

Bul. 1. *Virus diseases of fruit trees in Washington,* E. L. Reeves (pp. 25).—This part covers a description of the symptoms and an evaluation of the problem each disease presents, and is based largely on investigations and data obtained in the State during the past 10 yr. and as such constitutes a background for the following survey.

Bul. 2. *Report of the 1942 stone fruit virus disease survey in Washington,* D. M. Coe (pp. 19).—This deals specifically with the results of a stone fruit virus survey conducted during the summer of 1942 and is intended to serve as a reference for fruit growers in the State and as a possible guide to inspectors, nurserymen, and others interested in problems of the fruit industry.

A foreword of the two parts is by F. E. DeSellem.

Wood rot of fruit trees (*Agr. Gaz. N. S. Wales, 54 (1943), No. 7, pp. 318–322, illus. 10*).—The two most common and serious types of wood rot fungi in New South Wales are said to be *Polystictus versicolor* and *Schizophyllum commune.* Other locally important forms are *P. cinnabarinus*, *Valsa leucostoma*, and *Corticium salmonicolor*. These rots are illustrated and control measures suggested.

Mosaic, false sting, and flat limb of apple, J. F. Hockey (*Sci. Agr., 23 (1943), No. 11, pp. 633–646, illus. 11*).—Mosaic and false sting are described as two virus diseases transmissible by grafting. Transmission trials by sap or aphids gave negative results for mosaic but are not reported for false sting. In mosaic, destruction of the green pigment and disorganization of the starch in chlorotic areas of affected leaves were observed. In false sting, an abnormal vascular pattern was noted in the fruits. Both diseases can be kept in check by roguing coupled with care in selecting the scions. Flat limb is a branch distortion trouble particularly affecting Gravenstein apples but also found on other varieties. Successful transmission by grafting was obtained in less than 50 percent of the trials but in none by budding. This, with the other evidence obtained, supports the theory of a stock-scion relationship as the initial cause of flat limb of apples.

Incipient magnesium deficiency in some New York apple orchards, D. Boynton, J. C. Cain, and J. Van Geluwe. (Cornell Univ.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 95–100, illus. 1*).—The authors report on studies of an interveinal leaf blotch observed in several New York orchards and said to resemble that described and attributed to Mg deficiency by several other investigators. In one mature New York orchard, injection, spraying, and soil applications of Mg salts appeared to reduce the prevalence and severity of the symptoms. In a second orchard of 3-year-old trees, soil application of Epsom salts seemed partially effective as a control measure.

The influence of some horticultural practices on bitter pit in Okanagan-grown apples, J. E. Britton, D. V. Fisher, and R. C. Palmer (*Sci. Agr., 23 (1943), No. 11, pp. 651–675, illus. 6*).—Bitter pit as it occurs in Cox Orange, Northern Spy, and Newtown apples grown in the Okanagan Valley, B. C., is described and illustrated. The more important results of comprehensive harvesting and storage experiments with these varieties, involving over 1,000 boxes from more than 100 individual trees located in 10 orchards, were as follows: Fruit from trees with less than one-third of a full crop proved much more succeptible than that from trees with a heavier load. Harvesting at desirable maturity as indicated by maturity tests reduced significantly but did not entirely prevent the appearance of bitter pit. Prompt storage at 32° F. delayed and tended to reduce slightly the development of the trouble. After a 2–mo. storage at 32° most of the affected specimens had reached a stage at which pitting could be readily discerned on the surface. Seasonal weather conditions materially influenced the development of 'pitting in Newtowns which proved very susceptible to the disorder from 1937 to 1940 but "quite resistant" in 1941 and 1942. The practicability of control measures based on these findings is discussed, the factor of primary importance being to insure that fruit from trees carrying less than a third of a crop is kept separate from the main tonnage.

Experiments with ground and tree spraying for apple scab control in 1942, G. W. Keitt and J. D. Moore (*Wis. Hort., 33 (1943), No. 6, pp. 141–142, 145*).—Though no final decision as to the possible place of ground spraying in the control of apple scab can as yet be made, the results of 1942 tests indicate it to have been a very valuable supplement to tree spraying under the seasonal conditions encountered.

Spray materials and new concepts in the control of apple scab and cedar-apple rust fungi, J. M. Hamilton and D. H. Palmiter. (New York State Expt. Sta. et al.). (*N. Y. State Hort. Soc. Proc., 88 (1943), pp. 19–22*).

Diseases of pears in Washington, J. G. Harrar and J. D. Menzies (*Washington Sta. Pop. Bul. 171 (1943), pp. 31, illus. 7*).—This is a summary of present knowledge on the causes and control of the pear diseases known to occur in Washington State, including those due to bacteria, fungi, and viruses as well as troubles of nonparasitic origin.

Phosphorus deficiency in pears, L. R. Bryant and R. Gardner. (Colo. Expt. Sta.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 101–103, illus. 2*).—A serious trouble of pear trees in Colorado distinguished by burning of the leaf margins and tips, decrease in leaf size, improper fruit development, short terminal growth, scaly bark, and dying back of new growth is attributed to P deficiency on the basis of crop tests and the results of applications of phosphate fertilizers. A favorable influence of S applications is believed due to the decreased alkalinity and consequent increase in available P in the soil.

Armillaria root rot of fruit trees in the eastern United States, J. S. Cooley. (U. S. D. A.). (*Phytopathology, 33 (1943), No. 9, pp. 812–817*).—Surveys in many of the fruit regions in the eastern and central parts of the country resulted in occasionally locating stone-fruit trees attacked by *Armillaria*. The fungus was isolated from peach roots from the sand-hill region of North Carolina, but no evidence was obtained showing whether *Armillaria* was the initial cause of decline or whether the fungas had followed some disorder caused by adverse environment. Observations for 8 consecutive years on a diseased peach tree in the Coastal Plain of Maryland showed a slow advance of *Armillaria* in the affected tree, but no indication of spread to surrounding trees. At monthly intervals for 2 yr. inoculations were made on young pome- and stone-fruit trees. These usually gave negative results, but in some cases small lesions developed which healed by the next year. Inoculation of replants in an old peach orchard in North Carolina in which *Armillaria* was present also failed to produce the disease. Natural infection has not occurred on these test trees.

Dormant spraying with monocalcium arsenite for the control of brown rot blossom blight in apricot trees, E. E. Wilson and C. E. Scott. (Univ. Calif.). (*Blue Anchor, 20 (1943), No. 3, pp. 8–9, 27, illus. 2*).—Because of the difficulty of controlling apricot blossom blighting by *Sclerotinia laxa* with the usual control methods, the California Experiment Station several years ago began to search for a satisfactory dormant spray. Of the 5 or 6 among 45 materials thus far tried which have given the most hopeful results, monocalcium arsenite is most promising. Applied in late winter it has proved capable of preventing a large percentage of the spores from developing and of destroying those already present. A blossom spray with bordeaux or some other good copper fungicide is advised in addition, and in severe infections a second year's dormant treatment may also be needed.

Leaf scorch and die-back of apricots, E. L. Proebsting and C. J. Hansen (Univ. Calif.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 270–274, illus. 4*).—Many mature apricot trees in the Hollister Valley, Calif., are reported to have shown a leaf scorch and dieback which failed to respond to injections of a mixture of minor-element salts and could not be related to soil factors. This condition was observed only on trees propagated on Myrobalan root, and trees on this root which had formed scion roots were usually in better condition than those which had not. Trees inarched with apricot seedlings exhibited marked recovery after 3.5 years' growth.

Von der Fettfleckenkrankheit der Kirschen [The "grease spot" disease of cherries], A. Osterwalder (*Schweiz. Ztschr. Obst u. Weinbau, 51 (1942), No. 15, pp. 309–311, illus. 1*).—Olive-green spots observed on green cherries were found to be filled with masses of rod-shaped bacteria. Cultures isolated from these spots and inoculated into sound fruits induced the development of similar spots within a few days.

Some results from experiments on cherry leaf spot control in 1942, G. W. Keitt and J. D. Moore (*Wis. Hort., 33 (1943), No. 7, p. 175*).—Subject to modifications to meet unusual conditions, two spray programs based on the season's tests are recommended for Wisconsin.

A macrochemical reaction for the detection of peach mosaic, A. O. Simonds and E. W. Bodine. (Colo. Expt. Sta.). *Science, 97 (1943), No. 2530, pp. 587–588*).—The method involves adding a drop of saturated solution of phloroglucinol in 100 percent methyl alcohol to the thinnest possible free-hand section of a root or stem and, after drying, a drop of nitrophenolic acid in methyl alcohol solution. Differentiating color reactions were found to characterize xylem from healthy v. mosaicked trees. No differential coloring was shown by this method for the golden net and "X" diseases.

Inheritance study of root knot nematode resistance in certain peach varieties, J. H. Weinberger, P. C. Marth, and D. H. Scott. (U. S. D. A.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 321–325, illus. 1*).—Open-pollinated seedlings of 151 peach varieties grown at Fort Valley, Ga. (1934-42) in heavily infested soil all proved susceptible, as also were Tennessee Natural seedlings commonly used as peach stock in the East. Most of the number-designated peaches of the U. S. D. A. Division of Plant Exploration and Introduction likewise proved susceptible, but a few exhibited a high degree of resistance under conditions where Natural seedlings were heavily infested. Among the highly resistant groups, both Shalil and Yunnan seedlings have been described as possessing unusual vigor; whether one will prove superior to the other for peach trees in the Southeast remains to be seen. Shalil trees have a low chilling requirement to break the rest period, and their early blooming makes them susceptible to spring frosts. On the other hand some of the Yunnan trees are hardier and their buds have a chilling requirement similar to Elberta and so offer more promise as a seed source. The character of resistance is shown to be dominant in nursery trees of both Shalil and Yunnan groups and may be transmitted through either the male or female parent.

The small fruit disease control situation in 1943, R. F. Suit. (N. Y. State Expt. Sta.). (*N. Y. State Hort. Soc. Proc., 88 (1943), pp. 138–141*).—A brief summary of the new spray schedules.

Raspberry leaf curl (*Fruit-Grower [London], 96 (1943), No. 2483, p. 51, illus. 1*).—Note on serious and widespread outbreaks in Scotland of a hitherto unidentified disease of raspberries shown to be graft-transmitted. From evidence at hand it is assumed to be a virus infection identical with the former "Baumforth's disease" and closely resembling the American "leaf curl."

The occurrence of Stereum purpureum on the raspberry in New Zealand, R. M. Brien and J. D. Atkinson (*New Zeal. Jour. Sci. and Technol., 23 (1942), No. 6A, pp. 346A–348A, illus. 2*).—This is a first report of raspberry infection by the silver-leaf fungus in New Zealand. The disease was readily transmitted by inoculation into healthy Lloyd George raspberry plants.

Blueberry diseases in Maine (*Maine Sta. Bul. 419 (1943), pp. 395–417+, illus. 16*).—A survey over several blueberry regions of Maine and through several seasons showed that witches'-broom, leaf rust, and powdery mildew leaf spot are often severely injurious. Less important diseases included are red leaf, *Sclerotinia* shoot blight and fruit rot, *Botrytis* blossom blight and fruit rot, and brown leaf-spotting. The relative and actual importance of these diseases varied with the region and season. Disease control without fungicides includes pruning, eradication, burning, and choice of resistant varieties and wild clones. Copper-lime dust proved generally better for foliage disease control and increased yields than the other fungicides, which included bordeaux, lime-sulfur, sulfur, Oxo-bordeaux, copper cyanamid, and copper carbonate. Aggravation of slight leaf injuries by arsenical dust ranked next in importance to fungi as a cause of leaf injury. Copper-lime-arsenic dust controlled both fungus and insect injury better than either copper-lime or arsenical dust and thus indirectly also greatly reduced arsenical injury. It is recommended that, where diseases cause leaf injury and premature defoliation, copper-lime-arsenic dust be applied when about 80 percent of the blossoms have fallen and again about 10–14 days later. There are 38 references.

Breeding rust resistant black currants, A. W. S. Hunter and M. B. Davis (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 467–468*).—This is a progress report on breeding for resistance to foliage diseases, particularly white pine blister rust, using *Ribes ussuriense*, several plants of the so-called Colorado currant, and the standard varieties Boskoop Giant and Kerry as breeding material.

Studies of fig leaf blights, E. C. Tims, and F. Bonner. (La. State Univ.). (*La. Acad. Sci. Proc., 6 (1942), pp. 13–34, illus. 5*).—When three apparently different fungi causing leaf blight of fig, viz, *Corticium stevensii*, *Rhizoctonia microsclerotia*, and *Rhizoctonia* sp., were compared with *R. solani* and *C. koleroga*, the five forms were found to differ appreciably in many cultural characters but all were pathogenic on fig leaves under favorable conditions of moisture and temperature. The faster-growing forms were usually the more destructive. *C. stevensii* and *Rhizoctonia* sp. formed basidial mats with spores on the lower surface of some inoculated leaves; the others produced basidia rarely or not at all. The forms could be differentiated by cultural characters but not all with certainty by their basidiospores. The evidence presented favors maintenance of *C. stevensii* and *C. koleroga* as separate species. Good control of these fig blights was obtained with a dormant arsenate spray mixture.

Pierce's disease of grapevines, W. B. Hewitt, N. W. Frazier, H. E. Jacob, and J. H. Freitag (*California Sta. Cir. 353 (1942), pp. 32, illus. 17*).—This disease, first reported in California some 58 yr. ago and now known to be due to a virus transmissible by grafting (E. S. R., 80, p. 636), has recently been found in nearly all of the grape sections of the State and has become epidemic in the central San Joaquin Valley. In the field it is transmitted by at least three leafhoppers (*Draeculacephala minerva*, *Carneocephala fulgida*, and *Cicadella circellata*). Lists are presented of varieties found to exhibit typical and nontypical symptoms. Vineyards have been kept in good production by roguing infected plants and replanting with healthy ones. Replanting may be done by layering, approach-grafting to newly planted phylloxera- or nematode-resistant rootstocks, and by planting rootings or bench grafts. Two other troubles, little leaf and black measles, which may be confused with this infection, are differentiated, and a table presents a seasonal comparison of the symptoms of all three.

New developments in grape spraying, R. F. Suit. (N. Y. State Expt. Sta.). (*N. Y. State Hort. Soc. Proc., 88 (1943), pp. 22–29*).—A brief discussion of bordeaux concentration, spreader-stickers, insoluble coppers, spray injury, and recommended schedules based on recent research by the New York State Station.

Soil conditions affecting production of perithecia in banana leaf spot disease, R. Leach (*Nature [London], 151 (1943), No. 3824, p. 199*).—Perithecial formation by *Mycosphaerella musicola* in Jamaica is mainly seasonal, being greatest between August and January, but in a few isolated areas perithecia are formed profusely throughout the year. This "out-of-season" production was positively correlated with growing the host plant on highly acid soils. Control by bordeaux is satisfactory only when carried out before onset of the ascospore season.

Mercury compounds applied to banana plants in the field, C. H. Meredith (*Phytopathology, 33* (*1943*), *No. 9, pp. 835–836*).—According to results of the soil applications reported, the banana plant apparently can withstand higher concentrations of mercurials than *Fusarium oxysporum cubense.* The Hortosan potato dip was observed to stop growth of the Panama-disease fungus in the soil after a 9-mo. weathering; it was more effective in acid than in neutral soils. Other compounds tested were DuBay 1155–HH, Hg_2Cl_2, and $HgCl_2$.

Control measures against swollen shoot virus disease of cacao, A. F. Posnette (*Trop. Agr.* [*Trinidad*], *20* (*1943*), *No. 6, pp. 116–123, illus. 1*).—In continuation (E. S. R., 85, p. 368), this serious virus disease was found to occur in scattered outbreaks, each of which then spreads radially by infection of neighboring trees. Detailed figures illustrate the rate of spread, and the history of control experiments is presented to show the degree of success attained. In spite of increased frequency of outbreaks, the annual loss of trees was reduced in 1942 to only a third that of 1940 by checking the tree-to-tree spread. None of the six methods tried gave complete eradication from large outbreaks in one operation. Since repeated treatment is usually necessary, it is concluded that control can be effected most economically by removing the infected trees and only one ring of symptomless trees around them. Outbreaks of less than six infected trees can usually be checked by roguing only those showing symptoms. Unpublished results by G. S. Cotterell indicate transmission with certain mealybugs (Coccidae), a psyllid *Mesohomotoma tesmanni,* and an aphid *Toxoptera aurantii,* all of which are said to be common and widespread in the Gold Coast.

Estudio de la susceptibilidad presentada por diversas especies y variedades de citrus al ataque de Phytophthora citrophthora (Sm. & Sm.) Leon., S. Arentsen S. (*Bol. Sanid. Veg.* [*Chile*], *2* (*1942*), *No. 1, pp. 54–60, illus. 3*).—All citrus species inoculated proved susceptible to *P. citrophthora* in greater or less degree, and, in addition, appreciable differences were observed among the varieties of a single species. The high susceptibility of lemon was confirmed. The reactions of some 26 *Citrus* species or varieties are tabulated.

Recomendações para combater e minorar os estragos da "podridão das radicelas" dos citrus [Recommendations for the control of citrus root rot], A. A. Bitancourt (*Biológico, 9* (*1943*), *No. 2, pp. 41–44*).—Brief notes are presented on this disease, including control by grafting on less susceptible rootstocks.

Potash in relation to citrus nutrition, H. D. Chapman and S. M. Brown. (Calif. Citrus Expt. Sta.). (*Canning Age, 23* (*1942*), *No. 11, pp. 581–582*).—Based on greenhouse and outdoor controlled culture tests, the symptoms of K deficiency and excess and the effects on them of high B, Ca, and Mg are briefly described. It is concluded that analyses in California during July–September of tissues from trees not affected by other malnutrition types are indicative of the K status of the trees.

Sulphur damage probed: Scientists study physiological effects of chemical on citrus, F. M. Turrell, F. Cuneo, H. Carns, and D. Slack. (Calif. Citrus Expt. Sta.). (*Citrus Leaves, 23* (*1943*), *Nos. 6, pp. 6–8, illus. 6; 7, pp. 9–11, illus. 5*).—As checked by the authors, S was found to volatilize at ordinary air temperatures, and great increases in volatility occurred with small increases in temperature. Penetration of the citrus fruit peel appeared to be brought about by the action of high temperatures on solid S particles on the surface of S-dusted fruit. Two reactions are said to occur when this gaseous S enters the protoplasm, viz, it is first reduced to H_2S and is then oxidized to sulfate. The H_2S gas was produced in larger amounts by S-treated lemon fruits in spring than in summer. Its production per unit time increased rapidly on rise in temperature from 90° to 120°, and the total amount formed also increased up to 115° but decreased with additional rise in temperature. The gas penetrates the rind and may injure the fruit but does not influence its vitamin C content. Whether H_2S is the actual agent in S burn or is simply a byproduct indicative of an injurious preliminary reaction is not yet known. The intensity of the sun's radiation received and not dissipated by reradiation or conduction from the citrus fruit is said to be one of the environal factors influencing S burn. High relative humidity, warm air, and lack of air movement are secondary though important factors in the development of this blemish.

Nuestro campesino debe recononcer los cafetos enfermos [Coffee diseases], F. Flor C. (*Bol. Consorcio Centros Agr. Manabi, 4 (1942), No. 31, pp. 42–45*).—Brief notes on the diseases due to *Corticium koleroga, Cercospora coffeicola, Omphalia flavida, Rostrella coffeae,* and *Capnodium* spp.

Control of manganese deficiency in a commercial tung orchard, R. D. Dickey and M. Drosdoff. (Fla. Expt. Sta. and U. S. D. A.). (*Amer. Soc. Hort. Sci. Proc., 42 (1943), pp. 74–78*).—The Mn-deficiency disorder of tung trees called frenching and reported from Florida in 1937 (E. S. R., 78, p. 655) was found in commercial orchard practice to respond satisfactorily to soil applications of 2 lb. of 65 percent $MnSO_4$ to mature trees on Arredonda loamy fine sand soil. $(NH_4)_2SO_4$ alone or combined with $MnSO_4$ proved beneficial, but addition of $MgSO_4$ failed to enhance the effectiveness of the $MnSO_4$ treatment.

Diseases and pests of ornamental plants, B. O. Dodge and H. W. Rickett (*Lancaster, Pa.: Jaques Cattell Press, 1943, pp. 638+, illus. 201*).—In part 1, diseases and pests in general, the authors have endeavored not merely to give fromulas and instructions but to lay the foundation for a rational approach to the problems of disease and pest control. Although the work is addressed to gardeners rather than scientists, the scientific names of fungus parasites and animal pests (including insects) are also given. In part 2, diseases and pests of particular hosts, the plants are arranged alphabetically by their scientific names. The selection is based on the 3,000 species and varieties grown at the New York Botanical Garden and includes all the more important ornamentals of the United States. An attempt has been made to select those diseases and animal pests which have been most injurious in the eastern part of the country; most of these are also the most troublesome in other parts of the United States and of the world. The subject index includes the scientific names of parasites and the common names of the plant hosts; since the botanical names of the latter are arranged alphabetically in the text, they are not repeated in the index.

Carnation diseases transmitted by cuttings, P. E. Tilford (*Canad. Florist, 38 (1943), No. 5, pp. 71–72*).

Carnations attacked by bacterial wilt on coast and in Midwest, D. B. Creager. (Ill. Nat. Hist. Survey). (*Florists' Rev., 91 (1942), No. 2348, pp. 13–15, illus. 2*).

Carnation mosaic, D. B. Creager. (Ill. Nat. Hist. Survey). (*Phytopathology, 33 (1943), No. 9, pp. 823–827, illus. 2*).—Carnation mosaic was observed frequently in Illinois greenhouses, and similar, if not identical, carnation troubles have been reported previously from the United States, Europe, and Asia. Leaves and stems of affected plants are mottled, streaked, and flecked, and flowers of colored varieties are broken. Experimental and observational data indicate this mosaic to be due to a virus, evidence not presented by earlier workers. The virus can be transmitted readily from diseased to healthy plants by grafting, it can be carried from one crop to the next in cutting, and in the field it is spread from diseased to healthy plants, possibly by insects.

Observations on the bacterial crown, stem, and bud rot of Delphinium, S. WILHELM. (Univ. Calif.). (*Phytopathology, 33 (1943), No. 9, pp. 806–811, illus. 2*).—The *Erwinia phytophthora*-induced crown rot of perennial delphinium and stem and bud rot of rocket larkspur are strongly favored by excessive soil moisture. Losses from these diseases may be greatly reduced by applying a minimum of water in furrows at a distance from the rows and by planting on low ridges. Particular care in irrigation is necessary after the flower spikes begin to elongate. The bacteria can live over in the soil in a highly infective state, at least from one planting cycle to the next. Crop rotation is thus advisable in the commercial production of seed and, where possible, in ornamental plantings. The disease may become destructive on soils of low inoculum potential if the ground is saturated with water; in the interest of maintaining a low degree of infectivity in the soil, excessive irrigation should be avoided. Though the disease is definitely worse on both hosts in the summer months, it may also become destructive during winter. The time of flower-spike elongation is critical for this disease in both types of delphinium and is apparently correlated with the appearance of deep cracks in the stem bases. Varietal differences in susceptibility have been noted in both delphiniums.

Sphaerotheca humuli var. fuliginea on Delphinium in California, K. F. BAKER. (Univ. Calif.). (*Phytopathology, 33 (1943), No. 9, pp. 832–834*).—*S. humuli fuliginea* was found to have been present on cultivated and wild delphiniums in California for at least 19 yr. No published records have been found of its occurrence on these or other Ranunculaceae in North America, but it has been reported elsewhere on several representatives of the family, mostly in northern Europe and Siberia. Although this parasite is apparently rather rare on present commercial delphiniums, the potential threat to any new types developed renders the determination of its present distribution of special interest. The latter is facilitated by a method for rapid examination of quantities of mildew material to determine whether this fungus is present with the ubiquitous *Erysiphe polygoni*.

Changes in the structure of the cells induced by the "yellow flat" virus disease of Easter lilies, J. DUFRENOY. (La. State Univ.). (*La. Acad. Sci. Proc., 6 (1942), p. 35*).—Cytoplasmic strands with a honeycomb structure and differences in the mitochondria in infected epidermal cells were noted.

An investigation into the "stripe" disease of narcissus.—II, Experiments on the virus agent and its spread, J. CALDWELL and I. W. PRENTICE (*Ann. Appl. Biol., 30 (1943), No. 1, pp. 27–32, illus. 3*).—An earlier paper[4] described the symptoms and suggested the existence of a virus complex responsible for their expression. Through the experiments here reported it was found that the disease is not carried over in the seed but is transmissible by juice inoculation (carborundum method) and by grafting. In the field, transmission occurs above ground and not through the roots, but the identity of the vector has not yet been established. The effect of the disease in reducing bulb growth and vigor was studied, and control by roguing is recommended.

Dermatea bicolor on Amelanchier, J. W. GROVES (*Mycologia, 35 (1943), No. 4, pp. 459–464, illus. 3*).—*D. bicolor* n. comb. on *Amelanchier* spp. is described.

A new species of Phyllactinia, D. H. LINDER (*Mycologia, 35 (1943), No. 4,*

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[4] Ann. Appl. Biol., 25 (1938), No. 2, pp. 244–253, illus. 9.

pp. 465–468, illus. 5).—This powdery mildew fungus attacking *Eleagnus argentea* in Wyoming is described as *P. eleagni* n. sp.

Phytophthora rot of belladonna, J. T. Middleton. (Calif. Citrus Expt. Sta.). (*Bul. Torrey Bot. Club, 70* (*1943*), *No. 3, pp. 244–251, illus. 3*).—This rot of *Atropa belladonna* affecting the roots, crowns, stems, and leaves in California is believed to be the first detailed account of a *Phytophthora* rot of this host in the United States. The cardinal temperatures for the fungus, identified as *P. parasitica*, are 10°, 30°–32.5°, and 37.5° C. Its pathogenicity to both mature and seedling plants was established. Control may be afforded by planting on light well-drained soils and using furrow rather than overhead irrigation; bordeaux, burgundy, or cuprous oxide sprays with a suitable wetting agent will aid in reducing its spread.

The ability of *P. parasitica*, *Pythium debaryanum*, *P. irregulare*, and *P. ultimum* to cause damping-off of belladonna is also described and their pathogenicity established. This trouble was controlled by seeding in sterile soil and containers. Three materials used as seed-protectant dusts failed to give effective control of damping-off.

Cercospora on Morinda royoc, A. E. Jenkins and C. Chupp. (Cornell Univ. and U. S. D. A.). (*Mycologia, 35* (*1943*), *No. 4, pp. 480–482, illus. 1*).—A fungus causing a leaf spot of *M. royoc* from Florida and Haiti is described as *C. morindicola* n. sp.

The rusts of safflower, I. L. Conners (*Phytopathology, 33* (*1943*), *No. 9, pp. 789–796*).—*Puccinia carthami*, *P. verruca*, and *Aecidium carthami* have been reported on safflower. *P. carthami* is reported for the first time in Canada (at two places) and probably occurred at other points, as evidenced by teliospores found on seed samples. *P. kentrophylli*, reported by others on *Carthamus* spp., is not considered distinct from *P. carthami*. On the other hand, *P. carduncelli* is apparently a well-defined species, which has been reported on *Carduncellus caeruleus* and *Carthamus calvus*.

A contribution toward a clarification of the Trametes serialis complex, M. K. Nobles (*Canad. Jour. Res., 21* (*1943*), *No. 7. Sect. C, pp. 211–234, illus. 79*).—A fungus frequently isolated from a destructive brown cubical rot in Sitka spruce and Douglas fir and formerly referred to *T. serialis* has been connected with a fruit body collected on Sitka spruce in British Columbia. Through morphological, cultural, and interfertility studies, it is shown to be distinct from *T. serialis* and is described as *Poria microspora* Overholts n. sp. Similar studies of *P. sequoiae*, *P. carbonica* Overholts n. sp., and *Polyporus palustris*, all of which have been confused with *T. serialis* because of similarities between fruit bodies or cultures, have demonstrated the validity of each of these species and provided criteria for their separation on the basis of cultural characters. A key to the five fungi is provided.

Diplodia pinea and Sphaeropsis malorum on soft pines, A. M. Waterman. (U. S. D. A. et al.). (*Phytopathology, 33* (*1943*), *No. 9, pp. 828–831*).—Results of the observations and inoculations reported indicate that neither fungus parasitizes the leaves or twigs of new growth on young vigorously growing white pines, but both may occasionally be contributory to the unhealthy condition of soft pines weakened primarily by other agencies. Improved growing conditions and wound prevention or protection will lessen materially the possibility of infection.

A rust of Florida pines caused by Cronartium quercuum (Berk.) Miya, G. F. Weber. (Univ. Fla.). (*Fla. Acad. Sci. Proc., 5* (*1940*), *pp. 262–269, illus. 1*).—A general account on this gall or blister rust attacking several species of Florida pines and a wide range of southern oaks. The disease can be almost entirely prevented in the seedbed by locating it more than a half mile from the closest oaks.

Identity and host relations of Nectria species associated with diseases of hardwoods in the Eastern States, M. L. LOHMAN and A. J. WATSON. (U. S. D. A.). (*Lloydia, 6 (1943), No. 2, pp. 77–108, illus. 2*).—These Nectrias of the New England and Appalachian forest areas were grouped according to features now commonly recognized as important in their systematic treatment. The specimen groups were then compared biometrically as to ascospore size, and representative culture types were examined with respect to differential growth in response to malachite green in a special nutrient agar medium and to degrees of anastomosing between hyphae of different culture origin in paired combinations on a standard medium—the two latter methods of verifying either species relationships or the usefulness of simple analytical groups not hitherto employed in studying the Nectrias. This paper is concerned with the following types: *N. coccinea* Fr. *sensu* Wr., as found on bark of *Acer saccharophorum* in New England; *N. coccinea faginata* n. var., from weak and in most cases scale-infested diseased bark of *Fagus grandifolia* in New England and the Canadian Maritime Provinces; *N. galligena*, from bark, callus tissue, and recently exposed sapwood, particularly in association with cankers on bud-scale scars of various hosts throughout the eastern States; *N. magnoliae* n. sp., from bark, callus tissue, and recently exposed sapwood of *Liriodendron* and species of *Magnolia*, especially in association with cankers, from Connecticut to Ohio and southward through the Appalachian area; and with three rather distinct variations of *N. mammoidea* as found on dead *Betula* in Vermont, on dead *Quercus* in Maryland, and on living *Quercus* in Georgia, with but little indication of parasitism. For these fungi the morphological and cultural characteristics are described, host relationships are discussed, and important diagnostic features are tabulated. A key to these species is provided. There are 40 references.

A new method of controlling ink disease of the European chestnut, J. DEL CAÑIZO (*Internatl. Bul. Plant Protect.* [*Roma*], *16 (1942), No. 1, pp. 2M–3M*).—Serious infection by *Phytophthora cambivora* is said to threaten the approximately 5 million European chestnut trees in production in Spain. Treatment of the underground part of the trunk and base of the roots with an insoluble copper salt (usually $Cu_2(OH)_2CO_3$) mixed with an adhesive paste is reported to have acted not only as a preventive but also as a therapeutic measure.

Demonstration of Jassus indicus (Walk.) as a vector of the spike disease of sandal (Santalum album Linn.), S. RANGASWAMI and A. L. GRIFFITH (*Indian Forester, 67 (1941), No. 8, pp. 387–394, illus. 8*).—A preliminary report on this virus disease.

Injuries to trees caused by Celastrus and Vitis, H. J. LUTZ (*Bul. Torrey Bot. Club, 70 (1943), No. 4, pp. 436–439, illus. 3*).—Observations by the author over a period of years have revealed that bittersweet and grapevines cause distinctive injuries to the stems and branches of young trees. These injuries are discussed and illustrated. Other vines such as poison ivy and Virginia creeper climb trees but do not twine around the stems so as to cause constrictions. The most serious damage from grapevines, and from other creepers such as poison ivy and Virginia creeper, is the deformation and shading of tree crowns. In addition to the injury resulting from occlusion of bittersweet vines and bark in tree stems and the development of abnormal wood structure, avenues are opened for decay and wood borers.

Identification of Heterodera species by larval length: Technique of estimating the constants determining the length variations within a given species, D. W. FENWICK and M. T. FRANKLIN (*Jour. Helminthol., 20 (1942),* *No. 3-4, pp. 67-114*).—The destruction in the soil of cysts of the several cyst-forming species of *Heterodera* which cause serious damage to crop plants has thus far proved impracticable, and the only control measures that can yet be recommended are good husbandry and use of immune crops. The problem of host range has been much complicated in the past by the fact that it was not always realized that more than one species of nematode was involved. With the splitting of *H. schachtii* into four or five species (E. S. R., 86, p. 62), each with its own host range, there appears to be ground for assuming the host range of each species to be fairly rigid, though much further investigation on the exact limits is needed. The second part of the problem, that of identifying the cysts in a soil sample by inspection, is the object of the present report, which is concerned with methods of sampling, preparation of the larvae for measurement, and methods of measuring them. From the evidence resulting from this study, it follows that in estimating parameters for larval lengths of a population of, e. g., *H. rostochiensis* larvae, a truer figure will be obtained if a small number of larvae are taken from each of a large number of cysts rather than the same total number from a small number of cysts. Similarly, the cysts should come from a large number of plants, though it is apparently unnecessary that these be of as many varieties as possible. Detailed findings and procedures are presented.

ECONOMIC ZOOLOGY—ENTOMOLOGY

[Contributions on wildlife research and management] (*U. S. Dept. Int., Fish and Wildlife Serv., Wildlife Leaflets 176 (1941), pp. 12; 178, pp. 8, illus. 1; 179, pp. 8; 180, pp. 9; 181, pp. 4; 182, pp. 7; 183, pp. 4; 184, pp.* [2]*; 185, pp. 2, illus. 1; BS-186, pp. 9; 187, pp. 2; 188, pp. 2; 189, p. 1; 190, pp. 2; 191, pp. 10; 192, pp. 42; 193, pp. 7, illus. 4; 194, pp. 2; 195, pp. 2; 196, pp. 28; 197, pp. 2; 198, pp. 2; 199, pp. 40; 201, pp. 6*).—Further contributions in this series (E. S. R., 86, p. 351) are as follows: Nos. 176, Animal and Plant Resources of Alaska, by L. J. Palmer; 178, Inheritance of Degree of Silvering in Foxes, by C. E. Kellogg; 179, National Wildlife Refuges Administered by the Fish and Wildlife Service; 180, Aids for Bird Study; 181, The Control of Skunks, by D. D. Green and E. M. Mills; 182, Some Publications of Interest to Upland Game Bird Breeders; 183, Some Publications of Interest to Waterfowl Breeders; 184, Publications on Rabbits, Cavies, and Other Stock; 185, The Preparation of Blood Smears and Tissue Impressions for Laboratory Study, by D. R. Coburn; BS-186, Available Publications on Wildlife; 187, Hints on the Care of Opossums; 188, Raising Otters in Captivity, which supersedes BS-75 (E. S. R., 77, p. 652); 189, Publications on the Selection and Care of Furs; 190, Directions for Destroying Crawfishes; 191, Mink Raising, which supersedes BS-82 (E. S. R., 77, p. 652); 192, Selected Publications on Waterfowl and Gallinaceous Game Birds (With Special Reference to Propagation and Management, by M. Katz; 193, Directions for Collecting Materials for Food Habits Studies; 194, Publications on Trapping; 195, Directions for Poisoning Thirteen-Striped Ground Squirrels; 196, The Status of Migratory Game Birds, 1940-41; 197, Directions for Controlling Tree Squirrels; 198, Raising Muskrats, which supersedes BS-35 (E. S. R., 76, p. 356); 199, Abstract of Fur Laws, 1941-42; and 201, Publications on Attracting Birds, which supersedes BS-8 (E. S. R., 74, p. 511).

Wildlife Review, [May 1942–June 1943] (*U. S. Dept. Int., Fish and Wildlife Serv., Wildlife Rev. Nos. 34 (1942), pp. 68; 35, pp. 76; 36 (1943), pp. 52; 37, pp. 53*).—A continuation of this series (E. S. R., 86, p. 505).

The mammals of eastern United States: An account of recent land mammals occurring east of the Mississippi, W. J. Hamilton, Jr. (*Ithaca, N. Y.:*

Comstock Pub. Co., 1943, pp. 432+, illus. 185).—In the preparation of this work, which is intended to give brief descriptions and accounts of the distribution and habits of all the present-day land mammals naturally inhabiting the States east of the Mississippi River and is designed for students of mammalogy and for the increasing number of laymen who are interested in this important aspect of wildlife, the author has collected in 21 of the 27 States. Following a brief introduction and a key to the orders of eastern mammals, the work deals with the Marsupialia, Insectivora, Chiroptera, Carnivora, Rodentia, Lagomorpha, Artiodactyla, and Xenarthra, respectively. A key to the orders and to the families of rodents, keys to many of the genera of mammals, and sectional maps showing the distribution of the eastern species and subspecies are included. There follows a classified list of the literature of mammalogy, arranged under the headings of general works, journals, general anatomy, check list, references by localities (States), revisions and systematic works, and life histories.

An analysis of mink predation upon muskrats in north-central United States, P. L. ERRINGTON (*Iowa Sta. Res. Bul. 320 (1943), pp. 797–924, illus. 16).*—An introduction and a description of background and methods of study are followed by general considerations (pp. 808–833), including overlapping of habitats of minks and muskrats, killing and eating of muskrats by minks, intraspecific strife in muskrat populations, drought and vulnerability of muskrat populations to predation, and the mechanics of vertebrate predation in north-central United States. Seasonal and special aspects of mink predation upon muskrats (pp. 833–875) follow, which include the spring dispersal of muskrats and mink predation, security of breeding muskrats from mink predation, vulnerability of young muskrats to mink predation, mink predation upon late summer and early fall muskrat populations, and mink predation upon wintering muskrat populations. Intercompensatory aspects of mink predation upon muskrats (pp. 876–898) are then considered, namely, intercompensation in "natural" losses of muskrats and in muskrat losses associated with human activities, economic significance of intercompensatory trends in population phenomena of muskrats, and fur management and experimentation with reference to mink-muskrat relationships. A discussion and a list of 111 references to the literature cited follow, together with an appendix covering (1) scope and technical appraisal of mink-muskrat studies, 1915–42, north-central United States and (2) observed wounds resulting from intraspecific attacks of Iowa muskrats. The discussion closes with an addendum on winter and spring predation by minks upon muskrats.

Control of field mice in apple orchards, A. M. WOODSIDE, R. N. JEFFERSON, R. C. MOORE, and E. H. GLASS (*Virginia Sta. Bul. 344 (1942), pp. 16, illus. 7).*—The results of tests with poisoned baits and poisonous gases for the control of orchard mice, namely, *Pitymys pinetorum pinetorum* and *Microtus pennsylvanicus*, conducted in Augusta and Patrick Counties during the winters of 1939, 1940, and 1941 and the spring and summer months of 1942, are summarized in tables. Strychnine sulfate and white arsenic were each used on wheat and on cut pieces of apple, carrot, and sweetpotato. Zinc phosphide was also used on these baits, except wheat, and on steam-crushed whole oats. Tests were also made of Cyanogas and exhaust engine gas, and in addition some observations were made in orchards in which hogs and cattle were pastured. No poison or bait used in these tests gave uniform results in the destruction of mice even when the fresh baits were applied repeatedly. A change in bait, however, or of bait and poison generally gave better results. The results with poisonous gases seemed to depend somewhat upon the nature of the soil and the runs. In some types of soil there are many openings in the runways to the surface which permit gas to escape, resulting in poor control. Hogs and cattle in the orchard during the winter season tend to discourage mice. The information at hand indicates that one hog will root up and trample down about 2 acres of orchard during the winter season if feed is scattered over the land.

Leptospirosis in rats (R[attus] norvegicus) in and about Washington, D. C.: An evaluation of the methods used for diagnosis, C. L. Larson (*Pub. Health Rpts.* [*U. S.*], *58* (*1943*), *No. 25, pp. 949–955*).

Nesting birds and the vegetation substrate, W. J. Beecher (*Chicago: Chicago Ornithol. Soc., 1942, pp. 69+, illus. 11*).

A check list of North American amphibians and reptiles, L. Stejneger and T. Barbour (*Bul. Mus. Compar. Zool., 93* (*1943*), *No. 1, pp. 260+*).—A fifth edition of this check list (E. S. R., 70, p. 647).

Frog raising, A. Broel (*Detroit, Mich.: Marlboro House, 1943, pp. 152, illus. 61*).

Farm fish ponds: Suggestions for the building and management, C. E. Addy, C. F. Delabarre, and D. W. Cardwell. (Va. Expt. Sta. and U. S. D. A.). (*Va. Polytech. Inst. Bul., 35* (*1942*), *No. 11, pp. 46, illus. 11*).

Yield of fish increased by fertilization, W. B. Andrews (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 6, pp. 1, 7*).—A popular discussion.

Host list of the genus Trichomonas (Protozoa: Flagellata), B. B. Morgan. (Wis. Expt. Sta.). (*Wis. Univ. Compilation No. 1* (*1942*), *pp. 9*).

An illustrated laboratory manual of parasitology, R. M. Cable (*Minneapolis, Minn.: Burgess Pub. Co., 1943, rev., pp. 112+, illus. 104*).—A revised edition (E. S. R., 84, p. 789).

New developments in the study of ectoparasite resistance, L. Kartman. (U. S. D. A.). (*Jour. Econ. Ent., 36* (*1943*), *No. 3, pp. 372–375*).

[Notes on economic insects and insect control] (*Jour. Econ. Ent., 36* (*1943*), *No. 3, pp. 468–481, illus. 5*).—Contributions presented (E. S. R. 89, p. 561) are: The Control of the Oriental Fruit Moth by Mechanical Means, by G. E. Marshall (pp. 468–469) (Ind. Expt. Sta.); The Susceptibility of Parasitic Hymenoptera to Sulfur, by S. E. Flanders (p. 469), and A Pattern of [Citrus] Thrips Feeding Recorded, by C. S. Barnhart (pp. 476–477) (both Calif. Citrus Sta.); The Comparative Suitability of Potato and Tobacco as Hosts of the Potato Tuber Worm, by L. W. Brannon (pp. 469–470) (U. S. D. A. coop. Va. Truck Sta.); Differential Damage to Sweetclover Varieties by the Variegated Cutworm, by H. H. Walkden (p. 470) (U. S. D. A.); The Host Preference of the Sweetpotato Weevil, by K. L. Cockerham (pp. 471–472) (U. S. D. A. coop. La. Sta. et al.); Tests of N-Substituted *p*-Bromobenzenesulfonamides Against Codling Moth, by E. H. Siegler and S. I. Gertler (p. 473), Present Status and Future Trends of Nicotine as an Insecticide, by N. E. McIndoo (pp. 473–475), and The Toxicity of Some Heterocyclic Compounds to Young Screwworms, by L. E. Smith and R. Melvin (pp. 475–476) (all U. S. D. A.); Additional Notes on Host Plants of the Pink Bollworm in Texas and Mexico, by L. C. Fife and I. Moreno (pp. 478–479) (U. S. D. A. coop. Tex. Sta. et al.); Partial Replacement of Pyrethrins by Dichloroethyl Ether in Oil for Control of Corn Earworm, by G. W. Barber (p. 481) (U. S. D. A.); An Unusual Type of Ethylene Dichloride Injury to Peach, by J. S. Bailey and A. I. Bourne (pp. 470–471) (Mass. Sta.); A Portable Spray Boom for Experimental Plots, by G. M. List (p. 472) (Colo. Sta.); Naphthalene Paste, by G. E. Travis (pp. 477–478); Observations on a Lepidopterous Borer [*Podosesia syringae* Harris] in Ash, by J. M. Grayson (p. 479) (Va. A. and M. Col.); and The Common Toad as an Enemy of Blister Beetles, by N. P. Larson (p. 480) (S. Dak. Sta.).

Seventy-third annual report of the Entomological Society of Ontario, 1942 (*Ent. Soc. Ontario, Ann. Rpt., 73* (*1942*), *pp. 75, illus. 11*).—Contributions presented (E. S. R., 89, p. 91) include the following: The War Activities of the Federal Divisions of Entomology and Plant Protection Since 1939, by L. S. McLaine (pp. 7–16); Observations on the Numbers and Species of Bumble Bees Visiting Red Clover, by F. O. Morrison (pp. 16–20); The Japanese Beetle on the Niagara Frontier (A Short History of Discovery and Captures, 1940–42), by R. W. Sheppard (pp. 20–24); The European Corn Borer Situation in Ontario in 1942, by R. W. Thompson (pp. 24–26); Important Developments in the Corn Borer Parasite Situation, by G. Wishart (pp. 26–30); The Value of Molasses-Free Baits in the Control of Cutworms in Tobacco Fields, by D. A. Arnott and H. W. Goble (pp. 30–37); The White Grub Situation in Ontario During 1942 and a Forecast for 1943, by G. H. Hammond (pp. 37–39); The Potato Aphid Survey in the Maritime Provinces and Eastern Quebec, 1942, by R. P. Gorham (pp. 39–44); Some Problems Occasioned by the Presence of the Sugar-Beet Nematode *Heterodera schachtii* Schm. in Southwestern Ontario, by A. D. Baker and R. W. Thompson (pp. 44–47); A Discussion of the Pattern of Distribution of the Sugar-Beet Nematode *Heterodera schachtii* Schm. in the Blackwell District of Lambton County, Ontario, by A. D. Baker (pp. 47–51); Notes on the Lesser Peach Borer *Synanthedon pictipes* G. and R. in Ontario, by T. Armstrong (pp. 52–57); The Relation of Some Apple Sprays to Codling Moth Parasitism by *Ascogaster quadridentatus* Wesm., by H. R. Boyce (pp. 58–61); Tests With a Pyrethrum Aerosol Against Cockroaches and Stored Product Pests, by H. A. U. Monro (pp. 61–63); and A Summary of the More Important Crop Pests in Canada in 1942, by C. R. Twinn (pp. 64–70).

A method of collecting and storing without pressure insects and galls attached to leaves, C. B. Williams (*Roy. Ent. Soc. London, Proc., Ser. A, 18 (1943), No. 1–3, pp. 1–2, illus. 1*).

The group behavior of 14,000 insects to colors, H. B. Weiss (*Ent. News, 54 (1943), No. 7, pp. 152–156, illus. 1*).—This contribution reports upon the combined behavior of 23 species.

The generic names of British insects (*London: Roy. Ent. Soc. London, 1934, pt. 1, pp. 6, pt. 2, pp. 9–40+; 1935, pt. 3, pp. 45–60+; 1937, pt. 4, pp. 66–80+, pt. 5, pp. 81–149+; 1939, pt. 6, pp. 153–192+; 1940, pt. 7, pp. 196–209+; 1943, pt. 8, pp. 211–342+*).—This work, prepared by the Committee on Generic Nomenclature of the Royal Entomological Society of London, is presented in separate jacketed parts, 8 of which had been issued by June 1943. Following recommendations relating to the publication of the committee reports in part 1, parts 2 to 8 present, respectively, the generic names and check lists of the British species of Rhopalocera (Lepidoptera), Odonata, Neuroptera, Hymenoptera Aculeata, Carabidae (Coleoptera), Hydradephaga (Coleoptera), and Hemiptera-Heteroptera. Alphabetical indexes of the genera accompany each of the 7 parts and the species in parts 3 to 7, inclusive. A supplementary bibliography to the Hemiptera-Heteroptera and annexes to the eighth and ninth reports of the committee are included in part 8.

Cotton insect control in 1943, C. Lyle (*Miss. Farm Res. [Mississippi Sta.], 6 (1943), No. 6, p. 6, illus. 3*).—A practical account.

Controlling garden and vegetable insects in Iowa, C. J. Drake and H. Gunderson (*Iowa Dept. Agr. Bul. 10 (1942), pp. 52, illus. 32*).—A practical account.

The effect of arsenates on the storage of lead, L. T. Fairhall, J. W. Miller, and F. L. Weaver (*Pub. Health Rpts. [U. S.], 58 (1943), No. 25, pp. 955–959*).—In the work reported a soluble arsenate, such as sodium arsenate, when fed to rats receiving lead carbonate produced effects similar to those produced by lead arsenate alone. The administration of sodium arsenate with lead carbonate diminished the concentration of lead in the kidneys, while the concentration of arsenic amounted to only half that of the sodium arsenate group. More significant is the fact that arsenates in general definitely diminish the storage of lead in bone tissue.

A study of the dosage-mortality curve, F. M. Wadley and W N. Sullivan. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 367–372, illus. 2*).—A concentration-mortality relation study in which adult houseflies and pyrethrum sprays were employed is reported. The findings are summarized as follows: "There was strong indication of a definite threshold of toxic concentration. Numbers of insects were insufficient for checking the significance of 100-percent mortality at the highest concentration. The lower bend in the asymmetric sigmoid curve was not well defined. When spray concentrations were transformed to logarithms and percentages of mortality to probits, the data indicated significant and definite curvature. Linearity was positively disproved in this material. It seems likely that the log-probit transformation is useful but not perfect, that extrapolation should be discouraged, and that further study of the curve is justified."

Laboratory tests of termite shields, H. R. Johnston. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 386–392, illus. 1*).—Report is made of laboratory tests of various types of termite shields to determine what form or shape would be most effective in preventing subterranean termites from building tubes up to the woodwork of a building and to determine the fundamental principles that influence their effectiveness. "Sample shields were fastened on top of piers or cans, and the soil in which the piers were set or which was put in the cans was artificially infested with termites. Every type of shield tested was crossed at least once by a termite tube. The form proving most effective was that having a projection of 2 in. horizontally and an additional 2 in. downward at a 90° angle, but this type is difficult to construct and install properly. Smoothness of the surface of material and thin edges aided in stopping tube building, but if thin, smooth edges are in contact with wood or other objects their deterrent effects are nullified. Since no type of shield yet devised has been found entirely effective it is necessary to make occasional inspections of all shields that are installed. A simple shield of 26-gauge galvanized iron which projects at least 2 in. from the foundation and which is bent downward sufficiently to break contact between the edge of the shield and the woodwork of the building affords as much protection as do the standard 45°-angle types and is more economical to construct and install. Improper or incomplete shield installations are a waste of money and materials and give the home owner a false sense of security."

Tap-root damage of cotton, ascribed to termites, in the Sudan Gezira, F. Crowther and H. W. B. Barlow (*Empire Jour. Expt. Agr., 11 (1943), No. 42, pp. 99–112, illus. 3*).

Effects of pH and of various concentrations of sodium, potassium, and calcium chloride on muscular activity of the isolated crop of Periplaneta americana (Orthoptera), J. T. Griffiths, Jr., and O. E. Tauber. (Iowa Expt. Sta.). (*Jour. Gen. Physiol., 26 (1943), No. 6, pp. 541–558, illus. 2*).

Physiological characteristics of the diapause grasshopper egg.—II, Changes in density and weight during development, J. H. Bodine and W. A. Robbie (*Physiol. Zool., 16 (1943), No. 3, pp. 279–287, illus. 4*).—A continuation of this study (E. S. R., 84, p. 790).

Calcium cyanide fumigation for the western thrips, R. M. Bohart. (Univ. Calif.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 442–444*).—Report is made of greenhouse tests to determine the effect of calcium cyanide fumigation on *Frankliniella occidentalis* (Perg.). Experiments with greenhouse carnations have shown that varieties differed greatly in their reaction to cyanide fumes. "Tests conducted in empty greenhouses with thrips in mustard blossoms revealed the following points: (1) Thrips larvae were much more resistant to fumigation than the adults. (2) Thrips mortality was poor at less than 0.5 oz. of Cyanogas G-Fumigant per 1,000 cu. ft. (3) Overnight fumigation gave much higher kills than exposure for 3 hr. (4) High adult mortality was obtained at a dosage as low as 0.75 oz. for a 3-hr. fumigation and 0.5 oz. for an overnight exposure. It was concluded that during periods of heavy infestation weekly or biweekly fumigation for 3 hr. at a dosage of 0.75 oz. of Cyanogas G-Fumigant per 1,000 cu. ft. should give adequate control of *F. occidentalis* in a reasonably tight greenhouse. This should not result in objectionable plant injury if proper precautions are observed. However, before calcium cyanide fumigation can be used on carnations on a large scale more information is needed with respect to varietal response to cyanide fumes and the effects of humidity, temperature, and postshading."

Substitutes for tartar emetic and brown sugar in the control of the gladiolus thrips, F. F. Smith. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 445–452*).—In greenhouse and field experiments for control of the gladiolus thrips, conducted in 1942, "tartar emetic (2 lb.) with brown sugar (4 lb.) was equal in effectiveness to other combinations with corn sirup, cane molasses, or blackstrap molasses diluted to give similar sugar contents in the finished spray. Sodium antimony lactophenolate (8 lb.) with the same materials was equal or nearly so in effectiveness. One qt. of 40 percent nicotine sulfate in combination with 3 gal. of corn sirup or cane sirup per 100 gal. of spray on a thrips-susceptible variety of gladiolus was more effective than tartar emetic, while 3 qt. of corn sirup with nicotine appeared adequate to protect a moderately resistant variety. Maple sirup and honey were also highly effective. Minimum effective concentrations for all sirups have not been established. Nicotine sulfate combined with blackstrap molasses or corn molasses gave poor control. The sprays containing blackstrap molasses or cane molasses apparently caused rapid evolution of nicotine fumes, which loss possibly decreased the residual action of the nicotine. Combinations of lead arsenate with brown sugar, sirups, and molasses were less effective than tartar emetic or nicotine sulfate. In addition, they injured the foliage and flower petals showing color, as well as causing variable injury to the foliage and reduction in normal increase of corms. Paris green (0.4 lb.) combined with 3 gal. of corn sirup or 2 qt. of blackstrap molasses was highly effective and caused less injury than did combinations with larger quantities of molasses. The addition of hydrated lime or of magnesium hydroxide to paris green sprays reduced foliage injury but also the effectiveness against the thrips. Sorbitol and isoamyl salicylate tested as substitutes for sugar, and xanthone, phenothiazene, and two thiocyanates tested as substitutes for tartar emetic, were ineffective. Black sooty fungus developed on foliage sprayed with combinations of nicotine sulfate or tartar emetic and blackstrap molasses, but not with the combination sodium antimony lactophenolate and the same molasses. Addition of sodium benzoate (0.8 lb. per 100 gal.) to the nicotine or tartar emetic sprays prevented fungus growth."

Studies of methyl bromide, chloropicrin, certain nitriles, and other fumigants against the bedbug, H. H. Richardson. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 420–426*).—Tests with 26 chemicals or mixtures as fumigants against the eggs, nymphs, and adults of the bedbug, conducted in 12-l. glass flasks or a steel cylinder, are reported. "Approximately 150 5-hr. fumigations were made at 77°±0.9° F. with approximately 15,000 eggs and 30,000 nymphs and adults. In the fumigations in empty glass flasks hydrocyanic acid was the most toxic gas. It was followed by acrylonitrile and its mixture with carbon tetrachloride, chloroacetonitrile, chloropicrin, and dichloroethyl ether. Slightly less toxic in the descending order were 1,1-dichloro-1-nitroethane, methyl bromide, di- and tri-chloroacetonitrile, and ethylene oxide. The addition of carbon tetrachloride to acrylonitrile (1:1 by volume) to produce a nonflammable mixture also gave increased efficiency. Chloropicrin was more effective against the eggs than against the older nymphs and adults. The second to fifth instars were generally the most resistant and the eggs the least resistant. This relationship varied with some chemicals, the egg being most resistant to dichloroethyl ether and trichloroethylene. The egg was much more susceptible to ethylene oxide. Trichloroethylene had an anaesthetic action against the active stages. In tests with the more toxic materials in an unloaded steel cylinder the efficiency was just as great against insects protected by cotton batting as against those exposed directly to the gas. In a loaded steel cylinder methyl bromide and chloropicrin were the most efficient gases when used at a dosage of 16 to 20 mg. per liter (16 to 20 oz. per 1,000 cu. ft.) against bedbugs wrapped in cotton batting or in woolen blankets exposed directly to the gas, or packed in the center of a 25-lb. barracks bag (3 lb. of clothing per cubic foot of cylinder space). Hydrocyanic acid appeared slightly less effective, followed by acrylonitrile-carbon tetrachloride mixture, trichloroacetonitrile, 1,1-dichloro-1-nitroethane, ethylene oxide, and chloroacetonitrile, listed in the approximate order of descending efficiency."

Bibliography on lice and man, with particular reference to wartime conditions, M. E. Grinnell and I. L. Hawes (*U. S. Dept. Agr., Bibliog. Bul. 1 (1943), pp. 106+*).—Following the periods 1758–1899 and 1903–10, this annotated bibliography is arranged alphabetically year by year. An index is included.

Methods and equipment for fumigation of clothing infested with body lice, R. Latta and A. H. Yeomans. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 402–404, illus. 4*).

The use of sulfur and sulfur compounds in the control of poultry lice, J. T. Creighton, G. W. Dekle, and J. Russell (Univ. Fla.). (*Jour. Econ. Ent. 36 (1943), No. 3, pp. 413–419*).—Investigations of the value of sulfur and sulfur compounds in the control of poultry lice, conducted during the years 1939, 1940, and 1941, are reported, the details being given in 11 tables. The administration of dusting sulfur in broken doses amounting to from 4.5 to 9 gm. daily in capsules, before feeding, up to 35 days, proved ineffective. Incorporation of sulfur in a balanced mash feed in which the sulfur constituted from 5 to 10 percent by weight gave only limited control. In tests in which the chickens were periodically dusted with sulfur, excellent control was obtained. Small- and medium-scale soil treatment tests in which dusting sulfur was added at the rate of from 5 to 10 lb. per 100 sq. ft. indicated partial or complete control. A test conducted in which the birds were suspended in a pen 2 in. above heavily sulfur-treated soil gave no control, indicating that the effect is dependent upon contamination through the normal dusting activity of the birds. Sulfur-treated sawdust gave control in a manner similar to the soil treatments. In experiments with wettable sulfur and 32° B. lime-sulfur concentrate dips, the former at the rate of from 5 to 8 lb. to 100 gal. and the latter at the rate of 1 gal. in from 60 to 100 gal. of water, these materials were very effective, giving 100-percent control in from 1 to 2 weeks. Body residues were not permanent enough to protect the birds from reinfestation when they were exposed to heavily infested birds.

Evaluation of a field-control program directed against the beet leafhopper, W. C. Cook. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 382–385*).—In the evaluation of a field-control program against the beet leafhopper in central California comparisons were made of leafhopper populations or consequent curly top disease damage following or in the absence of spraying, which led to the conclusion that such comparisons are not feasible and that yield comparisons on this same basis are also questionable. A method is proposed for the evaluation of the control by estimating the potential spring brood from the performance of the females that survived the spraying. Selective killing of stronger- or weaker-than-average females tends to bias the results against or in favor of the control, respectively. Killing a large part of the fall population releases pressure and tends to favor the reproduction of the survivors, causing a bias in favor of control. The contributions of spring leafhoppers from breeding areas at various distances from beet fields are assumed to be proportional to their total populations and inversely proportional to their distances. A maximum safe population may be set for each breeding area, below which control must reduce the population to be effective. Control is ineffective if it be shown that the total population before spraying was so small that no damage would have resulted from their progeny.

Studies on host plants of the leafhoppers of the genus Empoasca, F. W. Poos and N. H. Wheeler (*U. S. Dept. Agr., Tech. Bul. 850* (*1943*), *pp. 51, illus. 21*).—This study on the seasonal abundance, host plants, biology, and feeding habits of certain leafhoppers of the genus *Empoasca* was conducted at the Arlington Experiment Farm, Va. More than 50 000 male specimens were determined. Twenty-three species were reared. The potato leafhopper was reared from 108 hosts. Seven species were reared from both the potato and sweetpotato. The injury caused by the potato leafhopper, which is considered the most important domestic species, is usually characteristic for each species of plant injured. This species has the peculiar habit of taking food from the phloem and xylem rather than the mesophyll, and two other domestic species (*E. recurvata* and *E. solana*) have shown evidence of having similar feeding habits.

The biological control of a mealybug [Pseudococcus kenyae Le Pelley] on coffee and other crops in Kenya, R. H. Le Pelley (*Empire Jour. Expt. Agr.*, *11* (*1943*), *No. 42*, *pp. 78–88*).

Pea aphid studies in Maryland, L. P. Ditman, E. N. Cory, C. Graham, and A. White (*Maryland Sta. Bul. A24* (*1943*), *pp. 359–378+*, *illus. 2*).—During a 5-yr. period at Ridgely derris sprays containing 4 percent rotenone at dilutions of 3 and 4 lb. per 100 gal. of water applied at the rate of 150 gal. per acre gave an average yield of 493 lb. of shelled peas per acre over untreated plats. The most satisfactory returns from treatment may be expected in seasons when aphid infestation begins early and is followed by sufficient rainfall to produce a crop of peas. Early appearance of aphids depends on warm weather in late March and April, since this favors development on alfalfa, the main overwintering host. Dusts containing 1 percent rotenone were as effective as derris sprays, but sprays and dusts of ground cube did not give adequate control. Sprays containing 3 pt. of nicotine sulfate with soap per 100 gal. of water gave better kills than derris sprays, but 4-percent nicotine dusts were not so satisfactory. A nicotine vapor fumer gave highest mortalities.

Experiments for the control of the cotton aphid, E. H. Floyd, I. J. Becnel, and C. B. Haddon (*Louisiana Sta., Northeast Louisiana Sta. Bien. Rpt. 1941–42*, *pp. 27–31*).—Yields of seed cotton in Louisiana per acre from plats treated in 1941 with calcium arsenate, 10 percent sulfur, and 0.5 percent rotenone; calcium arsenate; calcium arsenate and 1 percent nicotine; and calcium arsenate, 10 percent sulfur, and 0.2 percent pyrethrins were 1,384.0, 1,258.4, 1,674.4, and 1,368.0 lb., respectively, compared with 1,269.6 lb. for the untreated check. In 1942, treatment with calcium arsenate plus 1 percent nicotine; calcium arsenate plus 2 percent nicotine; 1 percent nicotine and a proprietary dust; and calcium arsenate alone resulted in yields of seed cotton of 3,019, 3,035, 3,062, and 2,835 lb. per acre, respectively, compared to 2,970 lb. from the untreated check. According to the authors, these experiments showed that nicotine used at 1-percent concentration in every application of calcium arsenate or at 2 percent in alternate applications is equally effective.

Effectiveness of cube and derris resins in a tank mix and an emulsive oil against California red scale, A. W. Cressman and B. M. Broadbent. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 439–441*).—It was found in experiments with a tank-mix oil that the addition of derris resins increased the mortality of the California red scale, but that 1.14 percent of resins in oil was no more effective than 0.57 percent. In one type of emulsive oil, scale mortality was proportionate to the amount of cube or derris resins in the oil over a wider range of resin concentrations.

The influence of fungicidal sprays on entomogenous fungi and on the purple scale in Florida, J. K. Holloway and T. R. Young, Jr. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 453–457*).—In an experiment designed to contrast the influence of inert residues and fungicides on the purple scale and entomogenous fungi it was found "that the inert residue contained in the sprays was the more important factor causing scale increase. The fungicides reduced infection of the scale by the entomogenous fungi, but the reduction caused no significant difference in the percentage of total scale mortality or in the total infestation. The percentage of total mortality was lower in both high-residue treatments. There was no difference in the percentage of total mortality between the two high-residue treatments, one of which contained copper. One yr. after the sprays had been applied there was no significant difference in total infestation which could be attributed to the use of copper sprays. The two high-residue treatments still had the highest total infestation, but there was a reduction over the previous year. The two main factors of reduction were the dropping of heavily infested leaves and the removal of the spray residue from the trees by rains. No increase in the percentage of scale infection by entomogenous fungi was obtained by applying a spray of fungus spores."

Influence of moisture and field dust on the susceptibility of the California red scale to HCN, H. R. Yust and R. L. Busbey. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 457–460*).—The influence of moisture and field dust on the susceptibility of the California red scale to fumigation with hydrocyanic acid vapor was observed in tests conducted in the laboratory under controlled conditions. Higher kills were obtained on wet than on dry lemon fruits regardless of the method of application of the water. Moisture increased the kill in exposures ranging from 10 to 60 min., in exposures to constant and decreasing concentrations of the gas, and in exposures in which there was protective stupefaction. Slightly better kills were obtained on clean than on dusty lemon fruits in certain of the tests made.

Biochemical studies on the sugar beet webworm (Loxostege sticticalis L.), with special reference to the fatty acids and their relation to diapause and sterility, J. H. Pepper and E. Hastings (*Montana Sta. Bul. 413 (1943), pp. 36*).—In the beet webworm a progressive increase in the saturation of fatty acids was noted from the first instar larva to the adult stage. Oleic acid represented 31.5 percent of the total fatty acids in the fifth instar larva and 70.8 percent of the total fatty acids in sterile females. Linoleic acid decreased from 26.1 percent of the total fatty acids to 0 percent for the same stages. Linolenic acid also decreased during these stages but at a slower rate. In three host plants studied 20.5 percent of the total fatty acids in lambsquarters was linoleic acid, while sugar beets and sage contained less than 1 percent. The suggestion is advanced that the linoleic acid content of the host plant is the determining factor in sterility. Lack of sufficient amounts of linoleic acid is believed responsible for this condition.

The squash vine borer, G. E. R. Hervey and H. C. Huckett (*New York State Sta. Cir. 127, rev. (1943), pp. 6, illus. 6*).—A revision (E. S. R., 67, p. 714).

Relation between parasitization of twig-infesting larvae of the oriental fruit moth and subsequent infestation of ripe peaches, H. W. Allen. (U. S. D. A.). (*Jour. Agr. Res.* [*U. S.*], *67* (*1943*), *No. 3, pp. 81–88*).—During 1937, 1938, and 1939, 51 orchards located in 11 peach-growing districts in Virginia, West Virginia, Maryland, and New Jersey were studied to determine the relation between parasitization of twig-infesting larvae of the oriental fruit moth and subsequent infestation of the fruit. When comparisons were limited to a single season and a restricted district where conditions affecting fruit moth abundance other than parasitization were generally uniform, high parasitization of second-brood twig-infesting larvae was followed by low fruit infestation. This condition was more evident in 1938 and 1939 than in 1937 and in the orchards in Virginia, West Virginia, and Maryland than in New Jersey. Factors other than observed parasitization apparently associated with the year and locality obscured the influence of second-brood parasitization in reducing fruit infestation when observations were compared in any other manner.

Further studies on rotenone and other organic insecticides for codling moth control, S. W. Harman. (N. Y. State Expt. Sta.). (*Jour. Econ. Ent.*, *36* (*1943*), *No. 2, pp. 200–204*).—The disappointing outcome of most of the early codling moth control work with rotenone and pyrethrum, which had to do very largely with commercial extracts, has led the author to employ the finely powdered plant product direct. The results of field work with organic insecticides in 1942, the details of which are given in tables, tend to confirm the findings of 1941 (E. S. R., 87, p. 829). Both nicotine and rotenone sprays from powdered products again proved highly effective in combating the codling moth when applied every week or 10 days during the period of codling moth activity. Nicotine was used both as the sulfate and as Black Leaf 155, while rotenone sprays were in the form of the powdered derris root. Pyrethrum sprays used both as the ground flowers and the extract gave some promise as a codling moth spray but were not as effective as either the nicotine or rotenone applications. Suitable spreading agents used with the insecticides allowed the fruit to color normally and left it free of objectionable visible residues.

Chemotropic tests of materials added to standard codling moth bait, E. R. Van Leeuwen. (U. S. D. A.). (*Jour. Econ. Ent.*, *36* (*1943*), *No. 3, pp. 430–434*).—This is said to be the first of a series reporting the progress of work involving the testing of about 250 compounds or mixtures, in an attempt to discover a suitable attractant to be used in baits as a supplementary control measure for the codling moth. "The tests were made by floating a small vial of the material on the standard codling moth bait, composed of fermenting molasses solution, and comparing the number of moths captured with the number caught with molasses bait alone. About 50 of the materials increased the attractiveness of the molasses bait from 50 to 450 percent. Certain other materials decreased the attractiveness of molasses bait either by masking its odor or by repelling the moths. Pine tar oil, one of the most promising materials, was used in a number of additional tests and gave a marked increase in catch over the standard molasses bait."

Xanthone as an ovicide and larvicide for the codling moth, L. F. Steiner and S. A. Summerland. (U. S. D. A.). (*Jour. Econ. Ent.*, *36* (*1943*), *No. 3, pp.*

435–439).—Preliminary studies of xanthone, applied in regular cover sprays to apple trees on which codling moth eggs had been or were subsequently deposited by caged moths, conducted in 1940 and 1941, have indicated that early in the season this material is considerably more effective as an ovicide than 0.5 percent mineral oil with lead arsenate and a weak bordeaux mixture. In midsummer xanthone killed 33.7 percent of 20,392 eggs deposited between July 22 and August 11, during which time two spray applications were made. Nicotine sulfate (1–1,200) with mineral oil (0.75 and 0.5 percent) killed only 25.5 percent of 13,874 eggs during the same period. "Xanthone was most effective against eggs deposited soon after the spray application, whereas oil-nicotine was most effective against eggs that were in the black spot or advanced red ring stages at the time the sprays were applied. Xanthone was more effective on foliage, where most of the eggs are deposited, than on fruit, where its deposits appeared lighter. Oil-nicotine was more effective on fruit than on foliage, presumably because penetration and loss of the oil from other causes was more rapid from the leaf than from fruit surfaces. Xanthone was generally less effective as a larvicide in laboratory-field tests, whereas the reverse was true of oil-nicotine and the lead arsenate-bordeaux-oil combinations. In a field test the lead arsenate treatment gave better control of third-brood larvae than xanthone, partly because of the low resistance of the latter to weathering during the long period between the final cover spray and harvest and partly because of interplat migration of moths. In three-brood areas, where the incubation period is as short as 5 days and eggs may be deposited daily from early May to October and where high temperatures shorten the effective period of oil sprays, their ovicidal value is likely to be less than under the lower temperatures of two-brood areas."

Should plowing corn lands be mandatory under Massachusetts State law? A. W. Dewey. (Coop. U. S. D. A.). (*Massachusetts Sta., 1943, FM–11, pp. 10+*).—A discussion of the Massachusetts State law relative to treatment of corn stubble for corn borer control.

Control of the sugarcane borer in Puerto Rico by laboratory-reared parasites, G. N. Wolcott and L. F. Martorell. (P. R. Univ. Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 460–464*).—The summarized results of releases of laboratory-reared *Trichogramma minutum* Riley in Puerto Rican cane fields and the number of fields in 100 suitable for releases of this parasite in the island are reported in tables.

Cutworm and armyworm populations in pasture grasses, waste lands, and forage crops, H. H. Walkden. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 376–381*).—A study made of the abundance of cutworms and armyworms in 14 types of pasture grasses, waste lands, and forage crops in the vicinity of Manhattan, Kans., during the 4-yr. period 1937–40, inclusive, is reported. "A burlap sack trap method devised for estimating the comparative abundance of cutworms and armyworms proved satisfactory as a means of determining differences in abundance in the various habitats under observation. A total of 24 species of cutworms and armyworms was found inhabiting the different types of pastures, waste lands, and forage crops. Only 7 of the species were taken in abundance during the 4-yr. period, and these constituted 98 percent of the total number collected. Cutworm and armyworm abundance was consistently low in well-managed bluestem pastures, native hay meadows, and waste lands such as the dropseed and panic grass areas included in this study. Only three of the habitats selected for study, namely, little barley, bluegrass, and sweetclover, proved to be outstanding as apparently favored places, 53 percent of the total number of cutworms and armyworms having been taken in these three habitats alone. Parasites and disease played an important part in reducing abundance to a low level in 1938.

The damage caused was not always in direct ratio to the abundance of the caterpillars but was largely governed by the ability of the vegetation to outgrow the effects of the feeding."

Diking as a measure for sand fly control in salt marshes, J. B. Hull, S. E. Shields, and N. G. Platts. (U. S. D. A. et al.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 405–409, illus. 4*).—Report is made of the effectiveness of diking and pumping, conducted on 1,000 acres of marsh directly east of Ft. Pierce, Fla., from July 1939 through November 1941, for the control of salt-marsh sand flies (*Culicoides* spp.). When compared with the undiked marsh the degree of infestation was 90.1 percent lower in the diked area. During the period of November 1940 through November 1941, when the sanitary district pumped only for mosquito control, an average of 26.02 larvae were isolated from soil samples from undiked marshes and an average of 7.04 larvae from diked marshes. The degree of infestation was reduced 72.95 percent as compared with the undiked marsh. If the emergence of adult sand flies from the undiked marsh, as shown by the recovery cages, 1939–40, is considered 100-percent infestation, there was a reduction of 90.65 percent by diking. If the emergence in the undiked marsh is considered 100-percent infestation, then the infestation was reduced 82.78 percent by diking during 1940–41, although no special effort was made to dry the diked marshes.

Diking and pumping for control of sand flies and mosquitoes in Florida salt marshes, N. G. Platts, S. E. Shields, and J. B. Hull. (U. S. D. A. et al.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 409–412, illus. 2*).—Report is made of a study of some of the details on construction and costs of the county sanitary district control of sand flies and mosquitoes on 1,000 acres of salt marsh and 200 acres of high ground near Ft. Pierce, where the work above noted was conducted. These include a description of the types of dikes, impeller pump, and tide gate installations found most satisfactory and an analysis of the costs. A total of 47,370 ft. of dikes and canals was constructed at a cost of $11,309.37. Three pumping stations with automatic tide gates and impeller type pumps were installed at a cost of $1,438.08. The three units have an approximate pumping capacity of 33,000 gal. of water per minute against a head of 3 ft. The pumps were operated at an average cost of 25.1 ct. per hour in 1939 and 39.2 ct. per hour in 1940, the difference being due to the cost of repairs and the replacement of one motor.

A revision of Nearctic Dorilaidae (Pipunculidae), D. E Hardy (*Kans. Univ. Sci. Bul., 29 (1943), No. 1, pp. 231, illus. 109*).

Linseed oil soap—a new lure for the melon fly, M. McPhail. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 426–429, illus. 1*).—In the work reported, the details of which are given in tables, a comparison with other common soaps demonstrated linseed oil soap to be the strongest lure for melon fly, although cottonseed oil soap and corn oil soap are attractive. The findings suggest that a fatty acid may be the attractive component of linseed oil soap. Attempts to protect bitter melons in the field from fly injury by trapping with linseed oil soap were not successful due to reinfestation.

Natural reservoirs of some beetles of the family Dermestidae known to infest stored products, with notes on those found in spider webs, H. E. Hinton (*Roy. Ent. Soc. London, Proc., Ser. A, 18 (1943), No. 4–6, pp. 33–42*).

Flea beetles, H. C. Huckett (*New York State Sta. Cir. 126, rev. (1943), pp. 4, illus. 1*).—A revision (E. S. R., 67, p. 717).

Methods of wireworm control, J. A. Munro and H S. Telford (*Grafton [N. Dak.] News and Times, 63 (1943), No 10, pp. 23, 31, illus. 3*).

Damage by the bronzed birch borer in Maine, R. W. Nash (*Maine Forest Serv. Bul. 13 (1943), pp. 12, illus. 3*).—This more extended report[5] of the serious bark borer enemy of yellow and white birches (*Betula lutea* and *B. papyrifera*) considers the habits of the beetle, the type of injury, causes of its outbreak, tree growth studies, degree of injury by classes and plats, and effect of density of stands on borer infestation and future injury, together with management recommendations. Its attack has caused severe injury east and north of the Kennebec Valley, varying in intensity in different sections from 20 to 60 percent kill. West of this valley damage is not as yet generally severe except in adjacent areas and in parts of the Moose River watershed. Severe injury extended westerly in 1942 as evidenced by trees in many parts of the Kennebec area having a majority of their leaves curling and withering. It is felt that extensive damage will occur in the Rangeley region and western boundary.

New species of Crossidius from western North America (Coleoptera: Cerambycidae), E. G. Linsley. (Univ. Calif.). (*Ent. News, 54 (1943), No. 7, pp. 147–149*).

Penetrating sprays to control the mountain pine beetle, A. L. Gibson. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 396–398*).—Tests of penetrating sprays for control of the mountain pine beetle in lodgepole and whitebark (*Pinus albicaulis*) pine were conducted in various localities in Montana, Idaho, and Wyoming. The results have shown certain of these sprays to be highly toxic to the broods beneath the bark. Sprays of Diesel oil and orthodichlorobenzene combined low cost and control effectiveness to the greatest degree of any formula tested. The use of such sprays has the advantage of giving the best results during the most favorable working conditions of late spring when methods now employed cannot be used because of the hazard involved in the use of fire. The higher costs of materials used in penetrating sprays are expected to be largely offset by lower operation costs due to the better working conditions and a longer period during which spraying can be carried on.

Intensity of attacks by Scolytus multistriatus at distances from dispersion and convergence points, D. O. Wolfenbarger and T. H. Jones. (U. S. D. A.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 399–402*).—The investigation reported has shown twig crotch injuries by the smaller European elm bark beetle, the principal carrier of the organism causing Dutch elm disease, to occur more frequently around a dispersion point than around points where the beetles have come for breeding. The incidence of twig crotch injury around the dispersion-convergence point was similar to that around the dispersion point and dissimilar to the much lower rates around the convergence points. Brood galleries may be found as far as 4 miles from the place where the beetles that constructed them emerged.

The control of Limonius agonus (Say) on shade-grown tobacco in Connecticut, 1937–42, A. W. Morrill, Jr. (U. S. D. A. coop. Conn. [New Haven] Expt. Sta.). (*Jour. Econ. Ent., 36 (1943), No. 3, pp. 392–395, illus. 2*).—In the control work considered it was found that although the reduction in eastern field wireworm infestation was significantly greater in the plats treated with naphthalene and with dichloroethyl ether than in those not treated, the reductions obtained were not sufficient to be of much practical value to the grower. "That obtained by the use of dichloroethyl ether was sufficient to suggest the desirability of testing the material further under different conditions of application. The naphthalene was tested under sufficiently varying conditions of climate and application so that it would seem clear that, except under unusual conditions of high soil temperatures at setting time, the material is not satisfactory as a control method in this region. The *p*-aminoacetanilide, as used, was apparently without effect. The reductions of wireworm populations, both immediately following the treatment with carbon disulfide and at setting time the following spring, were highly significant. The use of this material in the fall after harvest in fields threatened with wireworm attack is apparently very effective in destroying the greater part of the wireworm population."

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[5] Maine Forest Serv. Cir. 4 (1942), pp. [4].

The effect of boll weevil infestation, A. L. HAMNER (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 6, pp. 4–5, illus. 4*).—Cotton plants react to the loss of squares punctured by the boll weevil by setting a higher percentage of the young bolls and by producing heavier bolls. A higher percentage of young bolls that matured was produced on plants that had as few as 10 percent of the squares removed throughout the season than on untreated checks. When bolls were protected from weevil damage, fewer were required to make a pound of seed cotton on the treated plats than on the check. With the exception of a few bolls set early and late in the season, four varieties of cotton set approximately 80 percent of their crop during the first 5 weeks of fruiting and over 70 percent during the second, third, fourth, and fifth weeks.

The occurrence of parthenogenetic females in some strains of honeybees, O. MACKENSEN. (U. S. D. A. coop. La. State Univ.). (*Jour. Econ. Ent.*, *36* (*1943*), *No. 3, pp. 465–467*).—In the investigation reported "parthenogenetic females were found to occur in 3 strains of bees. Of 13 laying virgin queens of a Caucasian strain, 3 produced a few workers; and in 2 Italian strains, 1 out of 11 (three-banded strain) and 17 out of 30 (golden strain) produced some worker offspring. The number produced by any one queen was estimated not to exceed 1 percent. Both workers and queens produced parthenogenetically appeared to be normal diploid individuals. Two generations of parthenogenetic queens were obtained. Heretofore such females have been reported only among the native bees of Syria, Tunisia, and the Cape region of South Africa. However, the data here presented indicate that this characteristic is more widespread than has been commonly believed and suggest that the many queens that have been reported to appear unexpectedly in hopelessly queenless colonies can best be explained as having arisen from eggs laid by laying workers.

Biology of a new ichneumonid parasite [Xoridescopus annulicornis] of the amaranthus stem weevil [Hypolixus truncatulus B.] of South India, P. N. KRISHNA AYYAR (*Indian Acad. Sci. Proc.*, *17* (*1943*), *No. 2, Sect. B, pp. 27–36, illus. 13*).

ANIMAL PRODUCTION

Some peculiarities of ruminant nutrition, H. GOSS. (Univ. Calif.). (*Nutr. Abs. and Rev.*, *12* (*1943*), *No. 4, pp. 531–538*).—A review of rumen digestion, with special reference to the syntheses of six of the known vitamins in the B complex, vitamin K, and protein from nitrogenous substances going beyond the work of Savage and McCay (E. S. R., 88, p. 95). Over 70 references are included.

Chemical composition, grazing value and vegetative changes of herbage in a typical plains pasture, W. N. MCMILLEN, Q. WILLIAMS, and W. LANGHAM. ([Okla.] Panhandle Sta.). (*Jour. Anim. Sci.*, *2* (*1943*), *No. 3, pp. 237–243*).—Analyses of samples of blue grama, buffalo grass, and Russian-thistle taken at bimonthly intervals throughout a year showed that moisture, crude protein, carotene, and phosphorus were high during the early stages of growth but decreased rapidly as maturity approached. Buffalo grass was superior to blue grama for winter pasture, and its chemical composition was less affected by clipping. Yearling Herefords grazing the 32-acre pasture an average of 129 days for 4 seasons made an average of 29.3 lb. of beef per acre per year. Sheep used 2 yr. added materially to the grazing capacity of the pastures and helped control weeds. Russian-thistles tended to be prominent in dry years but were crowded out by grasses in wet seasons.

How to feed proteins in wartime (*Oklahoma Sta. Cir. 113* (*1943*), *pp. 15*).—Suggestions for supplementing and reducing amounts of protein needed in rations for cattle, sheep, swine, and poultry (including turkeys), with a list of the publications of the station on the subject.

The feeding values of green lucerne and lucerne hay, M. H. French (*East African Agr. Jour.*, *8* (*1943*), *No. 4*, *pp. 241–243*).—Analyses are presented which indicate that green alfalfa grown under irrigation in the dry season has the same nutritive value as that grown without irrigation in wet seasons. Alfalfa cut before flowering had a higher feeding value than that cut after bloom.

Commercial feeding stuffs, L. S. Walker and E. F. Boyce (*Vermont Sta. Bul. 500* (*1943*), *pp. 56*).—The guaranteed and found analysis for 1,900 samples of commercial feeding stuffs and proprietary feeds representing 946 brands are presented, with separate indication of the less than 10 percent failing to comply with requirements (E. S. R., 88, p. 85).

The economy of home butchering, S. Bull (*Springfield: Ill. Farmers' Inst.*, [*1943*], *pp. 16*, *illus. 2*).—Slaughtering, cutting, and curing hog and beef carcasses are described.

The preparation of muscular tissues for histological study, E. Johnson, F. N. Andrews, and C. L. Shrewsbury. (Ind. Expt. Sta.). (*Jour. Anim. Sci.*, *2* (*1943*), *No. 3*, *pp. 244–250*, *illus. 5*).—For microscopic study of samples of meat, the use of three fixatives—formalin-alcohol-acetic acid, chloroform-alcohol-acetic acid, and formalin on separate samples—is recommended. Ten percent formalin causes definite shrinkage and separation of the muscle fibers. Tissues fixed in formalin-alcohol-acetic acid showed practically no shrinkage of the fibers, but they tended to separate into groups. Connective tissue between the bundles was not apparent and the muscle fibers did not stain as readily as with 10 percent formalin. With chloroform-alcohol-acetic acid the appearance was intermediate between the above, and connective tissue was evident. The use of these fixatives in triplicate is recommended to insure against undetected artefacts. The formulas for the three fixatives with directions for their use is presented.

Determinations of metabolizable energy of feeding stuffs for cattle, E. B. Forbes and E. J. Thacker. (Pa. Expt. Sta.). (*Jour. Anim. Sci.*, *2* (*1943*), *No. 3*, *pp. 227–230*).—Comparison of the metabolizable energy of a basal ration of alfalfa hay, corn meal, and linseed meal with the basal ration and alfalfa-molasses silage, alfalfa-phosphoric acid silage, alfalfa-phosphoric acid silage and limestone, clover-timothy-molasses silage, soybean-molasses silage, corn silage, and soybean-sorghum silage is presented. These results were based on experimental determinations, including gravimetric measurements of methane, methane values of Bratzler and Forbes (E. S. R., 83, p. 669), Kriss formula for methane (E. S. R., 62, p. 862), and J. Axelsson's factors[6] with 7.8 calories per gram of ether extract of roughage and Axelsson's factors except the use of 3.3 calories per gram of ether extract of silage. The results show that 7.8 calories per gram of ether extract for the metabolizable energy of roughage was too high to represent the ether extract, especially the low-carbon ether-soluble organic acids, and 3.3 calories seemed to apply better for the silages. It should be used with the factors of Axelsson for digestible protein and carbohydrate in roughages to calculate the metabolizable energy in approximate agreement with experimental observations.

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[6] K. Lantbr. Akad. Tidskr., 80 (1941), No. 5, pp. 353–364.

Preliminary report on beef cattle feeding investigations, Z. A. Massey and S. W. Fisher (*Georgia Sta. Cir. 143 (1943), pp. 3*).—In 2 years' comparisons of hays in 155-day tests with 6 groups of 10 grade steers each, the best average daily gains were produced with kudzu hay. Peanut hay and peanuts on the vines ranked well up. Soybean hay was variable, ranking second one year and last another year. Lespedeza and sericea hays produced the poorest gains.

The value of alfalfa and certain of its fractions in the nutrition of breeding ewes, C. L. Shrewsbury, F. N. Andrews, C. Harper, and M. R. Zelle. (Ind. Expt. Sta.). (*Jour. Anim. Sci., 2 (1943), No. 3, pp. 209–220*).—The high nutritive value of both dehydrated and field-cured alfalfa was demonstrated for growth, maintenance, and milk production in sheep. The deficiencies of a basal ration of oat straw, corn, and corn silage were found not to be protein, vitamin A, or water-soluble factors in alfalfa juice. All of 14 groups of 15 yearling ewes each received rations of yellow corn, corn silage, and cane molasses. Average daily supplements were provided in different lots of about 2.5, 1.6, 0.86, and 0.42 lb. of dehydrated alfalfa hay with varying amounts of oat straw meal sufficient to supply necessary roughage. Other lots received field-cured alfalfa meal, concentrated alfalfa juice or the residue from fresh alfalfa, fat solvent from alfalfa cake, cottonseed meal, commercial casein, or dehydrated oat grass. The energy content of the rations was equalized by variation in the corn fed. Ground limestone was included when no alfalfa solids were given. The average gains in weight during pregnancy (38.5 lb. and 50.9 lb.) were greatest with the largest amounts of dehydrated alfalfa and dehydrated oat grass, respectively. The gains were smaller with the smaller amounts of alfalfa hay. The alfalfa juice supplement produced average gains of 31.3 lb. as contrasted with 32.6 lb. with field-cured alfalfa hay. It thus appeared that the necessary nutrients were included with alfalfa juice. The ration with oat straw roughage previously found deficient for breeding ewes (E. S. R., 87, p. 556) was improved with casein or cottonseed meal, but it was not as good as with alfalfa hay or alfalfa hay products. Thus protein per se was not the sole limiting factor. A supplement made up of recombined fractions of alfalfa press juice, fat solubles, and alfalfa press cake produced growth in ewes of 30.9 lb.

Cactus and oldman-saltbush as feed for sheep, H. C. Bonsma and G. S. Maré (*Union So. Africa Dept. Agr. and Forestry Bul. 236 (1942), pp. 72, illus. 18*).—The feeding of spineless cactus to sheep at will over 14 mo. had no ill effects on health. Different sheep showed marked differences in their adaptability to the spineless cactus. More than 50 percent on cactus alone were emaciated within 49 days. Acceptable supplements were alfalfa hay, corn meal, or peanut meal. In another experiment a daily ration consisting of 3 lb. of oldman saltbush (*Atriplex nummularia*) or 12 oz. of corn, together with cactus ad libitum, was sufficient to keep 80- to 95-lb. Merinos in satisfactory condition. In another experiment in which the saltbush and spineless cactus were planted and grazed together, the sheep were inclined to overgraze the cactus. An annual grazing rate of 19.2 sheep per morgen (2.12 acres) was not injurious to the crop in 4 yr., and the ration was not injurious to the sheep grazed. The value of saltbush as a supplement for sheep feeding during drought was proven. Adjoining saltbush and cactus plantations were successfully grazed under control by sheep over a period of 7 yr.

Production of wool and lamb from different types of ewes and breeds of rams, P. E. Neale (*New Mexico Sta. Bul. 305 (1943), pp. 26, illus. 17*).—A flock of about 1,200 range-raised Rambouillet ewes was divided into smooth- and tight-fleeced groups. Each group was further divided into lots of ewes bred to smooth- and tight-fleeced Rambouillet, Corriedale, Romney, and Hampshire rams. Concerning wool production and quality of the lambs, the long-fibered smooth Rambouillet rams and tight-fleeced ewes produced lambs with fleeces of the highest value. Even though the grease weight was greatest, the short tight-fleeced rams crossed on short tight-fleeced ewes produced the least valuable fleeces. Romney rams crossed on tight- and smooth-fleeced ewes produced lambs whose fleeces averaged 4.02 and 3.94 lb. of clean wool per head, respectively, whereas less was produced by the other crosses down to an average of 3.18 lb. by the tight-fleeced Rambouillet rams and ewes. Length of wool and diameter of fiber were about midway between the parents, and fine wool was necessary for the highest production. It was therefore recommended that the ewes be separated into two groups on the basis of fleece character and the longer-fleeced, coarser-wooled ewes be crossed with tighter-fleeced, shorter-wooled rams and vice versa. For lamb production the largest amounts of lamb per ewe, 64.1 lb., were produced by Hampshire rams mated to smooth-fleeced Rambouillet ewes. The size of the ewes was an important factor, as well as the feed of the lambs. Romney and Corriedale crossbred lambs were of good type but generally too light. The Corriedale, Romney, and Hampshire crossbreds were little larger than their dams.

Clean wool yield variation among regions of Rambouillet fleeces, E. M Pohle, H. W. Wolf, and C. E. Terrill. (U. S. D. A.). (*Jour. Anim. Sci., 2 (1943), No. 3, pp. 181–187, illus. 1*).—The highest clean yields of wool samples from eight body regions were obtained from the shoulder, thigh, withers, and belly, with 39.8, 39.7, 39.6, and 39.6 percent, respectively. The lowest yields of 37.5, 33.5, 31.8, and 31.3 percent, respectively, were obtained from the hip, back, side, and rump. The yield of clean wool for the entire fleece was 35.4 percent. Variance analysis showed that variation among regions was greater than among individuals, but both were highly significant. Averages of clean wool yields from all eight regions or from the shoulders, side, and back were more representative of the entire fleece than samples of any one region. The percentages of clean yield from a small sample of the shoulder, belly, thigh, side, and possibly the back are considered adequate for a breeding program. The clean yield is based on small samples of wool clipped from the eight different body regions of 30 yearling Rambouillet ewes.

Fiber density and some methods of its measurement in the fleeces of Rambouillet sheep, H. W. Wolf, W. M. Dawson, and E. M. Pohle. (U. S. D. A.). (*Jour. Anim. Sci., 2 (1943), No. 3, pp. 188–196, illus. 3*).—The average fiber density from eight regions on a group of 10 yearling Rambouillet ewes, based on three wool locks per region, was 5,280 (4,533 to 6,386) fibers per square centimeter. Similar measurements for 10 other yearling Rambouillet ewes were employed for a study of the variations observed between regions and differences between three wool density calipers. Three regions—rump, hip, and belly—were highly correlated with the total of eight regions for the prediction of fiber density. Comparisons of different calipers showed the Wyedesa to be more accurate than the Wira and Hairpin calipers.

Wool fineness in eight sampling regions on yearling Rambouillet ewes, E. M. Pohle and R. G. Schott. (U. S. D. A.). (*Jour. Anim. Sci., 2 (1943), No. 3, pp. 197–208, illus. 2*).—The tip, base, and middle diameters of fibers from the eight regions of the sheep employed in the above studies of 10 range yearling Rambouillet ewes showed that increases in the number of fibers beyond 100 to 200 decreased the standard error but slightly. Samples from one level and two regions were required to obtain a standard error of 0.692, which was consistent with the range usually observed in fine wool sheep. Measurements of samples from the shoulder, side, and thigh rank sheep in the same order as measurements from the eight regions. At least 10 sheep per group are required to make a difference of 2μ–3μ significant for a reasonable number of regions and levels when comparing fleeces from progeny of different sires.

Karakul sheep, the producers of Persian lambskins, P. V. Ewing (*Chicago: Author, 1943, pp. 127, illus. 46*).—This book deals with the origin and world distribution of Karakul sheep, including principles of breeding, management, and marketing skins.

Comparative value of grazing crops for fattening feeder pigs, W. G. Kirk. L. O. Gratz, and V. E. Whitehurst, Jr. (*Florida Sta. Bul. 389* (*1943*), *pp. 15, illus. 5*).—In 3 years' trials, pigs grazing corn with tankage supplements made average daily gains of 1.75 lb. in 55 93-day periods and required 536 lb. of corn and 23.2 lb. of tankage per 100 lb. of gain. In other lots grazing corn alone or corn planted with cowpeas, corn and peanuts, or peanuts alone, it was calculated that the tankage saved 155 lb. of corn per 100 lb. of gain compared with corn fed alone and 157 lb. of corn when the corn and cowpeas were interplanted. Grazing peanuts singly or with corn did not produce as large gains as corn with the tankage supplement. In three winter grazing trials, average daily gains of 1.74 lb. were made on Florida runner peanuts, green oats, and tankage. Average daily gains of 1.69 lb. and 1.49 lb. were made on peanuts with and without tankage, respectively. A total of 48 pigs made average daily gains of only 1.11 lb. when grazed on sweetpotatoes with tankage. However, it was estimated that approximately 6 pigs could be fattened per acre on sweetpotatoes and only 3 pigs per acre on peanuts. It was calculated that 21.5 lb. of tankage saved 112 lb. of peanuts per 100 lb. of gain in winter grazing trials. However, excessive scouring was noted in the 2 years' tests with sweetpotatoes. There were included a total of 97 pigs in the summer trials and 92 pigs in the winter trials of from 59 to 91 days' duration.

The successful fattening of pigs on diets containing 20 percent of brewer's yeast, A. N. Worden (*Jour. Compar. Pathol. and Ther., 53* (*1943*), *No. 2, pp. 190–195*).—A lot of five Wessex Saddleback pigs was successfully fattened from weaning to marketing on a ration containing 20 percent dried brewers' yeast, 40 percent weatings, and 34.5 percent barley meal, with an average gain of 55.5 kg. in 98 days. A group of six animals on a control ration with 16 percent fish meal instead of the yeast gained 58.1 kg. in the same period. On the former diet there were consumed 3.97 lb. of feed per pound of gain, as contrasted with 3.79 lb. of the control ration per pound of gain. The Ca:P ratio of 1:1 permitted of normal skeletal development.

Yeast as a protein supplement for pigs and its relation to the appearance of rickets, R. Braude, S. K. Kon, and E. G. White (*Jour. Compar. Pathol. and Ther., 53* (*1943*), *No. 2, pp. 161–189, illus. 9*).—In three experiments with 94 pigs individually fed, rations with 8 and 20 percent dried yeast as the sole protein supplement with grains were compared. The protein needs were supplied by brewers' yeast, debittered yeast, and fodder yeast. Abnormal symptoms characterized as rachitic by macroscopical, radiographic, and histological examinations, Ca and P in the blood, and the bone ash determinations occurred in some of the animals. These conditions occurred on rations with 8 percent dried yeast and 1.5 percent limestone, but the abnormalities were not found with 1.5 percent calcium carbonate. Increasing the dried yeast to 20 percent even with 2 percent limestone or 2.5 percent calcium carbonate produced rachitic symptoms, which were, however, avoided by additions of cod-liver oil and to some extent by calcium. The rachitic symptoms were not produced by increasing the amounts of Ca and P in the 8 percent yeast ration to those in the 20 percent yeast ration. The studies were conducted with groups of large white pigs with litter mates on each of the kinds of yeast and controls, replicated eight times in 14–16 weeks' tests, with 50-lb. pigs. Microphotographs are presented of the bones of pigs on the different rations.

A study of the characteristics of live market hogs as related to the quality of carcasses produced, J. P. Willman and J. L. Krider. (Cornell Univ.). (*Jour. Anim. Sci., 2 (1943), No. 3, pp. 231–236*).—Correlations were found between the condition as determined by visual observations and the average thickness of back fat in the carcasses of 393 Berkshire, Chester White, and Duroc Jersey spring and fall farrowed pigs and crossbreds between these breeds. The thickness of the back fat of the carcass increased as the live or dressed weight increased, the linear correlations being +0.47 and +0.52. On the other hand, it was not possible to estimate before slaughter the thickness of the back fat. There was a correlation of +0.88 in each case between the circumference of the ham and the live and dressed weights. Certain differences were found between these breeds in carcass measurements, but further studies were needed before general conclusions could be drawn.

The slaughtering and curing of home-grown pork, G. Van Der Noot (*New Jersey Stas. Cir. 466 (1943), pp. 27, illus. 21*).—Directions for killing, dressing, and freezing pork, and recipes for pork products.

The metabolism of ascorbic acid in the horse, P. B. Pearson, M. K. Sheybani, and H. Schmidt. (Tex. Expt. Sta.). (*Jour. Anim. Sci., 2 (1943), No. 3, pp. 175–180*).—The plasma of five Shetland ponies was found in 30 observations to have an average of 0.32 ± 0.13 mg. of ascorbic acid per 100 cc. In the urine samples of these animals an average of 44.4 ± 25.8 mg. of ascorbic acid was excreted in 24 hr. or 0.37 ± 0.25 mg. per kilogram live weight. When 6 gm. of ascorbic acid was fed per day, there was an average increase of 0.15 mg. in the plasma. The average increment of 73 mg. of ascorbic acid per 100 cc. of urine following the ascorbic acid feeding leaves little doubt that a part of the ascorbic acid is assimilated by the horse. When 6 gm. of ascorbic acid was administered intravenously to five horses, from 31 to 77.3 percent was recovered in the urine over a 24-hr. period.

How to raise rabbits for food and fur, F. G. Ashbrook (*New York: Orange Judd Pub. Co., 1943, pp. 256, illus. 50*).—Principles and details of rabbit production and utilization.

Raising rabbits for home use, W. C. Thompson (*New Jersey Stas. Cir. 462 (1943), pp. 13, illus. 7*).—General directions for rabbit management and production and descriptions of breeds including reference to rabbit feeding (E. S. R., 63, p. 267).

Commercial poultry farming, T. B. Charles and H. O. Stuart (*Danville, Ill.: Interstate, 1942, 4. ed., pp. 556+, illus. 217*).—The principles and practices of poultry production are described, with special attention to incubation, brooding, laying, and meat production. Chapters are included on feeding, management, breeding, and marketing practices for eggs and meat. Accounts are also included on poultry diseases, the physiology of egg formation, and the breeds and varieties of poultry.

Poultry production in the South, D. F. King and S. L. Chesnutt (*Danville, Ill.: Interstate, 1943, pp. 243+, illus. 144*).—A book on poultry production, including general information on breeds, breeding practices, incubation, and parasites and diseases.

Dehydrated ground clovers and perennial grasses versus sun-cured alfalfa-leaf meal in broiler rations, W. C. Skoglund and A. E. Tomhave (*Delaware Sta. Cir. 13 (1942), pp. 14, illus. 2*).—At the end of 14 weeks' feeding of crossbred Barred Plymouth Rock × New Hampshire chicks, there was little difference in the growth induced in broilers of both sexes on all-mash rations in which western sun-cured alfalfa was compared with locally grown clover and perennial grass. Feed requirements, mortality, and feathering were similar and satisfactory. The studies were conducted with 4 lots of approximately 200 chicks each. The lots were divided according to sex.

Protein requirements of growing pullets, C. S. Platt (*New Jersey Stas. Hints to Poultrymen, 30 (1943), No. 3, pp. [4], illus. 2*).—If the original chick mash contained 19 percent protein, the protein content of the feed may be decreased for growth after a weight of 2 to 2.5 lb. is attained. A level of 13 to 14 percent protein may then be fed to broilers and pullets. This decrease is accomplished by increasing the amount of grain fed without changing the total protein.

Biliary amylase in the domestic fowl, D. S. Farner. (Univ. Wis.). (*Biol. Bul., 84 (1943), No. 3, pp. 240–243*).—Study of bile from the hepatic duct and gall bladder showed the presence of amylase in the gall bladder bile from 36 of 44 birds of different ages tested. Amylase was not present in the hepatic duct of any of the 6 birds tested. The optimum hydrogen-ion concentration of bile was similar to that of pancreatic juice. The amylase was thought to be secreted by the liver.

Types of houses for laying hens, R. C. Christopher and D. F. King (*Alabama Sta. Cir. 88 (1943), pp. 8, illus. 6*).—A comparison of egg production and feed consumption of 6 groups of 50 hens each under different housing conditions showed that birds without any house but with shade produced 92 percent as well as birds fully housed. In extreme cold weather the unhoused group lost tips of the combs and toes. The birds did not lay in proportion to the cost of their shelter, and there was little relation between the type of house and mortality. An inexpensive house having a dirt floor and a good roof was satisfactory for laying hens in Alabama.

DAIRY FARMING—DAIRYING

Protein in dairy cow rations during the present emergency, H. B. Ellenberger (*Vermont Sta. Pam. 1 (1943), pp. 11*).—It is concluded that during the emergency shortage of high protein concentrates the total protein in dairy rations may be reduced to a maximum of 16 percent if liberally fed, giving more attention to the individual needs for total digestible nutrients which may be supplied to a greater extent by good pasture and roughage.

List of sires proved in dairy herd improvement associations, 1943 (*U. S. Dept. Agr., Misc. Pub. 522 (1943), pp. 97*).—There are listed the records of the dairy sires proven in connection with the dairy herd improvement associations since the publication of Miscellaneous Publication 487 (E. S. R., 87, p. 846), together with the average milk and butterfat production for the cows to which the bulls were bred and their daughters.

Richmond's dairy chemistry, G. D. Elsdon and G. H. Walker (*London: Charles Griffin & Co., 1942, 4. ed., rev., pp. 472+, illus. 9*).—A revised edition of the book previously noted (E. S. R., 46, p. 113), bringing up to date present studies on factors influencing the composition of milk and dairy products and the newer chemical and physical determinations.

The status of regulations and practices in determining extraneous material in milk, K. G. Weckel. (Univ. Wis.). (*Jour. Milk Technol., 6 (1943), No. 3, pp. 146–151*).—The variations in the methods employed in grading milk for sediment and the variety of interpretations of the results are given special consideration. Uniformity is recommended.

Selecting cream to make butter that will meet Government mold standards, J. C. Boyd and J. A. Nelson (*Montana Sta. Bul. 415 (1943), pp. 16*).—A practical method for selecting cream for butter churning was suggested, based first on an organoleptic examination of cream which will make 90 score butter, with consideration to acidity, visual mold, and mold mycelia count. The flavor score, age, acidity, butterfat content, and microscopic mold counts of 117 samples of cream, and butter made from them, showed that cream samples scoring 89 or less, or which were more than 6 days old, or contained more than 0.51 percent acid showed considerable mold development. Moldy cream was not accurately detected by the microscopic count unless it contained mold counts of 100,000 or more per cubic centimeter. Cream containing from 40 to 50 percent or more butterfat was not as subject to mold development as cream containing smaller percentages of butterfat. The relationship of the mold mycelia grade of the butter to the flavor score, age, acidity, butterfat content, and microscopic mold count of the cream was similar to the relationship of these factors to the visual mold grade of the cream, which bears the closest relation of the cream to the mold content of the butter. As a further precaution against mold development, frequent cream delivery is recommended.

VETERINARY MEDICINE

[Contributions on veterinary medicine] (*U. S. Livestock Sanit. Assoc. Rpt., 46 (1942), pp. 8–12, 37–42, 67–73, 75–83, 114–148, 173–178, 185–188, illus. 7*).—Among the contributions presented at the annual meeting held in Chicago, Ill., in December 1942 are the following: Highlights and Shadows in Tuberculosis Eradication, by J. R. Mohler (pp. 8–12) (U. S. D. A.); Problems in Swine Practice, by T. L. Steenerson (pp. 37–42); Federal Meat Inspection in Wartime, by O. W. Seher (pp. 67–70); Epidemiology of Food-Borne Diseases, by J. H. Steele (pp. 71–73); Bovine Tuberculosis in Humans, by D. C. Lochead (pp. 75–78); Market Losses From Tuberculosis Today as Compared With Twenty-Five Years Ago, by H. R. Smith (pp. 79–83); North Carolina, a Bang's Disease Modified Accredited Area, by W. Moore (pp. 114–119); Calfhood Vaccination in New York, by E. T. Faulder (pp. 120–123); Incidence of Brucellosis in Swine, by W. L. Boyd, H. C. H. Kernkamp, M. H. Roepke, and C. E. Blye (pp. 124–128) (Minn. Expt. Sta.); Bang's Disease Immunity Tests and a New Vaccination Method, by M. M. Rabstein and C. Cotton (pp. 129–136) (Univ. Md.); Undulant Fever in Iowa, by C. F. Jordan (pp. 137–143); The Control of Bang's Disease in Relation to the Conservation of Meat and Dairy Products, by H. R. Smith (pp. 144–148); Cattle Grubs and How to Control Them, by B. Schwartz (pp. 173–178) (U. S. D. A.); and The Veterinarian's Responsibility in the Poultry War Effort, by C. D. Carpenter (pp. 185–188).

Some fundamentals of animal disease control, J. W. Benner. (N. Mex. Col. Agr.). (*Vet. Med., 38 (1943), No. 2, pp. 67–69, illus. 1*).

The influence of wild animals in the dissemination of disease of livestock in Australia, H. R. Seddon (*Roy. Soc. Queensland Proc., 54 (1942), pp. 12+*).

Studies of hydrogen-sulfide poisoning, R. W. Dougherty, R. Wong, and B. E. Christensen. (Oreg. State Col.). (*Amer. Jour. Vet. Res., 4 (1943), No. 12, pp. 254–256*).—The mounting number of cases of poisoning traced directly or indirectly to H_2S led to the present study of its toxic action. Concentrations of sulfhemoglobin in the blood of animals dying of H_2S poisoning were found to be much less than concentrations of sulfhemoglobin established experimentally in animals that lived. There was a decrease in the CO_2 content of blood of H_2S-intoxicated animals. Carbon dioxide given intravenously and a mixture of oxygen (90 percent) and carbon dioxide (10 percent) given through an inhalation mask increased experimental animals' tolerance for, but did not abolish, the toxicity of H_2S. Artificial respiration applied to animals intoxicated with H_2S prolonged life but did not prevent death.

Tyrosine poisoning in rats, W. C. Hueper and G. J. Martin (*Arch. Pathol., 35 (1943), No. 5, pp. 685–694, illus. 2*).—In the experiments conducted it was found that within 1 to 2 weeks rats kept on a diet containing 10 percent 1-tyrosine showed purulent keratitis and swelling and redness of the feet and legs and died within 5 weeks. Examination revealed degenerative, necrotizing, and fibrosing changes of the pancreas, affecting primarily the exocrinic tissue but leading ultimately to extensive destruction of the exocrinic and endocrinic tissues. In the kidneys additional degenerative and necrotizing lesions are found which apparently have their genesis in the excretion of a toxin. The arterioles of the brain, heart, lungs, and kidneys exhibit swelling and hyalinization of the media and occasionally proliferation of the intima, associated with focal hemorrhages, necroses, and glia cell accumulations in the brain. "The observations suggest causal relations between diseases of the biliary tract, pancreatitis, diabetes, and disturbances of the tyrosine metabolism and represent a warning against prolonged administration of excessive amounts of tyrosine for therapeutic purposes. It may be pointed out, however, that tyrosine represents a normal protein constituent for which there is a definite nutritional and metabolic need. Reactions of the type described do not occur as long as the amounts of tyrosine introduced exceed by a wide margin the physiologic need of the organism for this amino acid."

Penicillin and tyrothricin (*North Amer. Vet., 24 (1943), No. 7, pp. 401–404*).—A digest of recent findings with these therapeutic agents.

The evaluation of bactericides, E. R. Withell (*Jour. Hyg. [London], 42 (1942), No. 4, pp. 339–353, illus. 3*).

The penetrative powers of disinfectants, L. P. Anderson and W. L. Mallmann (*Michigan Sta. Tech. Bul. 183 (1943), pp. 23*).—It is pointed out that the activity or power to penetrate rapidly is a prime requisite of all compounds (antiseptics, disinfectants) designed to kill bacteria within a short interval of time, and that it is indispensable to all compounds even when allowed an extended time interval of action. Of the selected group of compounds studied, iodine is the only substance consistently penetrating under all the varied tests employed. These results are in harmony with its rapid, irreversible destruction of bacteria as compared with the slower action of the organic mercurial and the dye. Iodine in the form of colloidal iodine possesses inherent penetrative powers definitely superior to crystalline iodine that is dissolved in alcoholic potassium iodide and water. Chlorine acts only by oxidation, i e., first destroying the cell surface. The speed test employing bacteria is offered as a means of measuring the penetrative power of disinfectants and antiseptics. The contribution is presented with a list of 43 references to the literature cited.

The disinfectant activity of caustic soda, B. C. Hobbs and G. S. Wilson (*Jour. Hyg. [London], 42 (1942) No. 4, pp. 436–450, illus. 2*).—The results of quantitative observations made on the rate of disinfection of *Bacterium coli* and of the spores of *Bacillus subtilis* by caustic soda at different temperatures and different concentrations are reported. The tests were carried out in the presence of 1/1000 milk.

The chemical and physical investigation of germicidal aerosols.—II, The aerosol centrifuge, S. R. Finn and E. O. Powell (*Jour. Hyg.* [*London*], *42* (*1942*), *No. 4, pp. 354–364, illus. 11*).

The effect of sulfapyridine on cows known to eliminate Brucella abortus in the milk, I. Live, E. L. Stubbs, and M. R. Gardiner, Jr. (*Amer. Jour. Vet. Res.*, *4* (*1943*), *No. 12, pp. 276–286, illus. 6*).—Sulfapyridine was administered to six cows known to eliminate *B. abortus* in their milk, the treatment being given for periods of varying length, ranging from 11 to 42 days. "Two of the cows were treated twice, with an interval of 25 days. The dosage of sulfapyridine was 7 gm. per 100 lb. of body weight daily during the first week, 5 gm. per 100 lb. daily during the second week, and 4 gm. per 100 lb. daily thereafter. The maximum concentrations of free sulfapyridine in the blood and in the milk were attained during the first week of treatment and ranged between 8 and 18 mg. per 100 cc. All six cows developed anorexia, fever, and leucopenia in the course of treatment. One cow suffered from neutropenia, while the other five showed a tendency to neutrophilia, particularly at the time of a rise in body temperature. In addition, two cows developed lesions in the form of inflammatory nodules on the udder and teats; three of the animals suffered from leg weakness; and one developed a general urticaria. One cow showed slight icterus 2 days after treatment had been discontinued. Although the administration of sulfapyridine had a bacteriostatic effect upon *Brucella*, as judged by the decrease in the number of the organisms isolated from the milk or their total absence during treatment and shortly thereafter, *B. abortus* was isolated again from the milk of all six cows after treatment had been discontinued. Therefore, it must be assumed that the treatment with sulfapyridine did not have the desired chemotherapeutic effect upon brucellosis in the six cows."

Science smites Bang's disease: Strain 19 vaccine fortifies permanently against scourge that exacts $30,000,000 a year from cattlemen, G. E. Taylor (*N. J. Agr.* [*Rutgers Univ.*], *25* (*1943*), *No. 2, pp. 1–2, illus. 1*).

Some clinical aspects of experimental esophagostomiasis in cattle, J. S. Andrews and J. F. Maldonado. (P. R. Expt. Sta.). (*Amer. Jour. Vet. Res.*, *4* (*1943*), *No. 12, pp. 211–225, illus. 5*).—The experimental work here reported has shown that doses of from 20,000 to 260,500 larvae of *Oesophagostomum radiatum*, the common nodular worm of cattle, when administered by mouth to healthy calves weighing from 70 to 280 lb. at the time of infection, will produce symptoms similar to those observed by other workers in calves suffering from naturally acquired nodular worm infection. In the present investigation difficulty was experienced in the early diagnosis of the disease because of the lack of evidence of worm infection in the feces. It was discovered that when worm eggs did appear in the feces, not only had the damage to the intestinal wall already been accomplished by the larvae, but the eggs were so few in number that they would not ordinarily attract attention to the nematode infection producing them as being responsible for the intestinal disturbance exhibited by the infected animals. The number of adult worms recovered post mortem bore no relation to the severity of the symptoms shown by the calves. The weight gain per day of the infected calves was about one-seventh of that of the uninfected control calves. The stunting effect appeared to be permanent. Death occurred in one animal following infection with 82,000 nodular worm larvae. Esophagostomiasis in cattle was found to differ from the disease in sheep chiefly in the rarity with which the larvae of *O. radiatum* perforated the intestine of calves. This difference appeared to be due to the relatively greater thickness of the intestinal wall of cattle as compared to that of sheep. The symptoms shown by calves infected with *O. radiatum* were found to be indistinguishable from those observed in Puerto Rican calves suffering from "tropical diarrhea" and indicated that *O. radiatum* alone can be responsible for such cases.

A list of 36 references to the literature is included.

Bovine mastitis, O. W. Schalm (*California Sta. Cir. 355* (*1943*), *pp. 11*, *illus. 4*).—A practical summary of information.

The pathology of bovine pyelonephritis, F. Thorp, Jr., R F. Langham, C. F. Clark, and E. R. Doll (Mich. Expt. Sta.). (*Amer. Jour. Vet. Res*, *4* (*1943*), *No. 12*, *pp. 240–249*, *illus. 20*).—The results of a study of the pathology of six cases of bovine pyelonephritis are reported. Biochemical determinations on the blood and urine of two cases in the terminal stages indicated an increase of creatinine, uric acid, and nonprotein nitrogen in the blood. The urea ratio disclosed renal impairment. There were marked hematuria and albuminuria. The urine contained micro-organisms typical of *Corynebacterium renale*. The bacteria isolated from five of the six cases resembled *C. renale*. The microorganisms cultured from the sixth case (calf) belonged to the genus *Corynebacterium* and was a diphtheroid. The kidneys, ureters, and bladder revealed numerous inflammatory and degenerative changes both grossly and microscopically.

Staphylococcal antitoxin in the blood, milk, and colostrum of cows, W. T. Miller and J. O. Heishman. (U. S. D. A). (*Amer. Jour. Vet. Res*, *4* (*1943*), *No. 12*, *pp. 265–269*).—In the course of an investigation of another phase of bovine mastitis staphylococci were encountered so extensively that the present study was undertaken. A wide variation in the staphylococcal antitoxin content was found in blood samples from 220 cows and heifers. "No antitoxin was found in the blood serum of 57, or 25.9 percent, of these animals. Four units or less were present in 110. . . . In the 53 remaining animals, from 5 to 64 units were found. A clinical case of mastitis was responsible for the highest titer. Only a very rough correlation was noted between the antitoxin titer of the blood serum and infection of the udder with staphylococci. Normal milk, of which 60 samples were tested, contained 1 unit of antitoxin or less. In only 10 samples was any antitoxin found, and all of these were from cows with 16 to 96 units in the blood serum. Samples of secretion from the quarters of 2 cows with acute mastitis had 16 and 32 units in the diseased quarters and 1 unit or less in the healthy ones. The colostrum from cows with antitoxin in the blood contained considerable amounts of antitoxin. In a few cases the latter exceeded the blood titer from four to six times, and in one instance a titer of 128 units was found. There is also some variation in the antitoxin content between the four quarters of some udders. After parturition, however, the antitoxic titer drops fairly rapidly, and in several weeks no antitoxin remains in the milk." The report is accompanied by a list of 13 references to the literature.

Blackleg (Clostridium chauvoei) infection in sheep, G. W. Stiles. (U. S. D. A.). (*North Amer. Vet.*, *24* (*1943*), *No. 6*, *pp. 354–356*).—Report is made of two small outbreaks of blackleg in sheep, one in Colorado and one in Wyoming, each confirmed by laboratory diagnosis. The losses ceased following vaccination with blackleg bacterin.

The preservation of hog-cholera virus by desiccation under high vacuum, T. W. Munce and J. Reichel (*Amer. Jour. Vet. Res.*, *4* (*1943*), *No. 12*, *pp. 270–275*, *illus. 1*).—In the investigation reported it was found that when desiccated under high vacuum and stored in vacuo in flame-sealed ampules hog cholera virus of blood origin remained infective after exposure to a temperature of 60° C. for 96 hr. Phenolized liquid virus from the same mixture was noninfective after exposure to the same temperature for 5 hr. When desiccated under high vacuum and stored in vacuo in flame-sealed ampules, hog cholera virus of blood origin retained its infectivity for 328 days at 37°. Hog cholera virus of blood origin, when desiccated under high vacuum and stored in vacuo in flame-sealed ampules at 20° (approximately room temperature), was still infective in the last test, which was conducted after a storage period of 1,125 days. Hog cholera virus of blood origin, when desiccated under high vacuum and stored in vacuo in either flame-sealed ampules or in rubber-stoppered bottles at 2° to 6°, was still infective in the last tests after a storage period of 1,125 days. The results of the infectivity tests of the desiccated products stored at 37° and at 20° indicate that the virus desiccated under high vacuum and stored in vacuo in flame-sealed ampules retained its infectivity longer than when desiccated and stored in vacuo, at those temperatures, in rubber-stoppered bottles. The results of the tests for retention of antigenicity proved that a satisfactory degree of antigenicity was retained for at least 666 days when the desiccated product was stored in vacuo in rubber-stoppered bottles at a temperature of 2° to 6°.

Preserving swine erysipelas serum (*Nebraska Sta. Rpt.* [*1942*], *pp. 68–69*).—The addition of 10 mg. (10 percent) of Merthiolate (sodium ethylmercurithiosalicylate, containing mercury in organic combination) has been found to be an excellent way of preserving anti-swine-erysipelas serum. Such preserved serum samples, with one exception, proved to be sterile after a period of storage ranging from 11 to 31 mo. The exception was provided by the development of a colony of mold on the culture medium used in the tests. Average potency of the 16 samples in the quintuple parallel test series amounted to a numerical potency of 42 67 as compared with the average horizontal potency of 50.66 of the same group of serums revealed at an earlier date. Differences in the test methods applied, however, as well as the slight differences in the serums may somewhat vitiate this comparison. In the initial trials for the use of Merthiolate as a serum preservative it was found that addition of Merthiolate at the rate of 100 mg. percent apparently impaired serum potency. This, however, was not the case when the amount of Merthiolate was reduced to 25 mg. percent. In the course of further trials the addition of Merthiolate in the proportion of 10 mg. percent proved to be quite satisfactory.

A considerable volume of empirically obtained evidence has shown that if a culture of *Erysipelothrix rhusiopathiae* is to be effective in the serovaccination of swine it must not only be capable of rugged and voluminous growth but must also manifest a maximum degree of virulence. At present there seems to be an understanding that cultures for vaccination purposes may be issued for a period of 60 days after the date of preparation. The results indicate that 59.32 percent of a total of 59 culture samples examined after a storage of 60 days could be classified as acceptable for use in serovaccination. Some preliminary tests made at the station seem to indicate that loss of virulence can be attributed to a decline of the H-ion concentration of the fluid culture vaccine.

The effects of various intravenous injections on the horse, S. J. Roberts (*Amer. Jour. Vet. Res., 4* (*1943*), *No. 12, pp. 226–239, illus. 1*).—This contribution is presented with a list of 34 references to the literature.

Further studies on the titration and neutralization of the western strain of equine encephalomyelitis virus in tissue culture, C. H. Huang (*Jour. Expt. Med., 78* (*1943*), *No. 2, pp. 111–126, illus. 8*).—In continuation of the earlier study (E. S. R., 89, p. 252), the author reports having found that titration and neutralization of the western strain of equine encephalomyelitis virus can be carried out in vitro by means of tissue culture. The in vitro titration test as here presented has proved to be a more sensitive method than animal inoculation. Tissue culture may be better than animal inoculation for the detection of small amounts of virus. The neutralization obtained in tissue culture is 100 to 1,000 times greater than that observed in the intracerebral test in mice and is comparable to the potency obtained by the intraperitoneal route of inoculation. The possibility of applying this method to the study of other viruses, known and unknown, is discussed. Further applications of the method described to evaluation and standardization of bacterial toxins and antitoxins and to the testing of the toxicity of biological and chemical products are suggested. Evidence for the reactivation in vitro as well as in vivo of virus in neutral mixtures by dilution is presented. A list of 27 references to the literature is included.

The blood picture in equine influenza, F. D. MAURER and T. C. JONES (*Amer. Jour. Vet. Res., 4 (1943), No. 12, pp. 257–264, illus. 6*).—The results of a study of the characteristics of the blood picture in the horse during infection with equine influenza, made at the U. S. Army Remount Depot, Front Royal, Va., are reported. The methods employed in making the blood counts are considered, and charts of temperature curves correlated with differential leucocyte counts are presented for the common types of cases encountered.

Seasonal anthelmintic treatment of horses, C. E. HOWELL and J. W. BRITTON. (Univ. Calif.). (*Vet. Med., 38 (1943), No. 1, pp. 8–11, illus. 2*).

Distemper studies in foxes.—I, The experimental inoculation of foxes with formalized tissue of infected and of healthy ferrets during an epizootic, L. M. HEATH and P. J. G. PLUMMER (*Canad. Jour. Compar. Med. and Vet. Sci., 7 (1943), No. 6, pp. 163–174*).—The only tissue suspension employed in the experimental inoculation of foxes in the epidemic studied which was capable of protecting ferrets against experimental infection was that prepared from infected ferret tissues. However, a greater percentage of deaths occurred among those animals in the group of apparently healthy foxes treated with this suspension than in those of the same group treated with healthy ferret tissues. The percentage of deaths among those foxes in the sickly group treated with infected and healthy ferret tissues, respectively, did not vary to any extent. Both healthy and sickly groups received superimposed homologous tissue suspension. "Virus of low or attenuated virulence for ferrets was present in tissues and blood of naturally infected foxes from the outbreak. The virus after passage in ferrets was apparently incapable of reproducing disease and death in presumably susceptible foxes. Transmission of virus disease to presumably susceptible foxes by contact with naturally infected foxes was inconclusive due to complications with coccidia, but blood from one contact fox which survived when inoculated into a fox and a ferret apparently caused distemper and death in the former, while no symptoms of distemper [were] manifested by the latter as a result of the inoculum received. On the other hand, blood from a naturally infected fox in the last stages of the disease produced transient symptoms of disease of undetermined origin in a fox and mild symptoms of distemper in a ferret. Both animals recovered. The presence of inclusion bodies did not appear to be a reliable index for diagnosing distemper in naturally infected foxes."

Internal parasites of the red fox in Iowa, L. F. SMITH. (Iowa Expt. Sta. et al.). (*Jour. Wildlife Mangt., 7 (1943), No. 2, pp. 174–178*).

Science reports coccidiosis a menace to fox and mink, R. A. MUELLER (*Black Fox Mag., 27 (1943), No. 3, pp. 10–11, 21, illus. 3*).

A pathological condition of the fowl testis, L. P. DOYLE, G. L. SEARCY, and F. N. ANDREWS. (Ind. Expt. Sta.). (*Poultry Sci., 22 (1943), No. 2, pp. 188–189, illus. 1*).

Common internal and external parasites of poultry, H. C. McDougle and A. J. Durant (*Missouri Sta. Bul. 473* (*1943*), *pp. 24, illus. 25*).—A practical account.

Further studies on the propagation of fowl leucosis in chick embryos by intravenous inoculation, W. J. Hall and M. Pollard. (U. S. D. A.). (*Amer. Jour. Vet. Res., 4* (*1943*), *No. 12, pp. 287–293, illus. 5*).—In further work (E. S. R., 84, p. 251) the injection of leucosis blood by the intravenous route into 2,656 chick embryos during 30 serial passages resulted in the development of leucosis in 1,089 either in the embryonic stage or within a week after hatching. Of the total embryos inoculated 621 hatched, and of those hatching 389 died of leucosis. The number of undetermined cases amounted to 47.3 percent of the number inoculated. The high percentage of undetermined cases was due to their being left too long in the incubator after death, especially during the earlier passages when large numbers of embryos were inoculated. The incubation period and course of the disease in embryos averaged 7.4 days, while among the embryos which survived long enough to hatch the corresponding period was 14.8 days. Of the 30 serial passages of the leucosis agent through embryos, 16 passages were from egg to egg exclusively, while in each of the remaining 14 passages a few embryos were inoculated with blood from embryos after hatching. These chick-to-embryo passages amounted to 11 percent of the total embryos inoculated. Passages were made after hatching in these cases because an insufficient number of hemocytoblasts were present in the blood of the embryo to insure successful transmission. No explanation is offered for this variation in the incubation period of some embryos. While there was a steady increase in the percentage of takes in the leucosis-inoculated embryos after the tenth serial passage, this increase can be accounted for largely by the decrease in the number of undetermined cases, which was due to improved technic. There is as yet no conclusive evidence that the agent increased in virulence as the result of serial passage, since there was no decrease in the incubation period and course. There is also no evidence of any alteration in the nature of hematopoietic response in the young chick to the leucosis agent, strain A, after serial passage in chick embryos.

Ocular lymphomatosis, with special reference to chromatism of the irides, N. M. Nelson and F. Thorp, Jr. (U. S. D. A.). (*Amer. Jour. Vet. Res., 4* (*1943*), *No. 12, pp. 294–304, illus. 8*).—It is concluded that the symptoms and pathological changes described for typical ocular lymphomatosis are sufficient to distinguish it readily from apparently normal gray eyes or autochthonous eye ailments as they may occur. That affected birds may have a part in the transmission of the disease is now generally accepted, and until this belief has been disproved persistent culling of flocks in which lymphomatosis occurs is recommended. Birds affected with the ocular form only may be especially hazardous as breeders inasmuch as they frequently continue to produce eggs for long periods. Iridic chromatism is not sufficient evidence for a clinical diagnosis of ocular lymphomatosis. The symptoms of inflammation in the early stages, although applicable to iritis from other causes, should be given consideration. Likewise, in the advanced stages, the size, shape, and reaction of the pupil are most typical and significant in diagnosing the syndrome. No disease of the chicken eye with similar symptomological and pathological findings has been reported from the United States. Ocular lymphomatosis is confused mainly with so-called genetic gray eyes. In this discussion periorbital lesions have not been separated from eye involvement because frequently lesions in the ocular muscles, periorbital fat, etc., are found simultaneously with inner eye lesions. The question of whether the eye manifestation of lymphomatosis should be considered a "type" is alluded to. Although convenient from the standpoint of discussion, the term "ocular lymphomatosis" should not be taken to indicate dissimilarity from the visceral and nerve types on an etiological or pathological basis.

Studies on certain filtrable viruses.—V, The immunogenic properties of the entire chick embryo inoculated with fowl-pox virus, W. M THORNING, R. GRAHAM, and N. D. LEVINE. (Univ. Ill.). (*Amer. Jour. Vet. Res., 4 (1943), No. 12, pp. 250–253*).—In continuation of these studies (E. S. R., 85, p. 540; 89, p. 592) titration experiments and flock inoculations with entire-embryo fowl pox virus containing the extra-embryonic membranes, yolk, albumin, fluids, and embryo proper of inoculated developing chick embryos are reported. Virus titers ranged from 1:500 to 1:10,000 as determined by the stick and feather follicle methods of inoculation into susceptible chickens. The production of immunity was demonstrated by exposure of inoculated chickens to an homologous strain of chorioallantois-propagated virus. Thirty-five flocks comprising 25,164 chickens were inoculated with a 1:100 tryptone broth suspension of the entire embryo fowl pox virus by the stick method, and an average of 95.58-percent takes was recorded. In 5 of the 35 flocks inoculated, immunity was demonstrated in exposure tests.

A respiratory disease of young turkeys (preliminary report), J. F. HARR (*Calif. Dept. Agr. Bul., 32 (1943), No. 1, pp. 77–82*).—Report is made of the study of a respiratory disease of young turkeys, the symptoms and lesions of which resembled those of a disease said to have been described by A. G. Gierke[7] in 1934, but differ in most respects from the respiratory-nervous disorder of chickens and turkeys reported by Stover (E. S. R., 87, p. 722) and Hoffman (E. S. R., 88, p. 826), even though the air sacs were involved in both diseases. During the 1942 brooding and rearing season it was found widespread in several California localities. Field investigations were made in 21 flocks in which the mortality varied from 10 to 50 percent. Sudden losses occurred only in a few instances. However, a large number of birds died throughout the season, and considerable loss resulted from birds not gaining and finishing properly. In many instances the respiratory symptoms were sufficiently severe to handicap the birds in eating. In one or two instances individual birds in infected flocks were found showing nervous symptoms characterized by dullness of the eyes, spasmodic loss of equilibrium, lameness, and a twitching of the head. In some flocks many birds developed swollen hocks. The cases of respiratory disease observed occurred in birds on several types of feeds. Examination of the formulas for these rations failed to reveal any probability of a vitamin A deficiency as described by Hinshaw and Lloyd (E. S. R., 72, p. 374). This preliminary study did not involve extensive laboratory investigation. Additional research is necessary for positive identification of the nature of the disease.

The infection of turkeys and guinea fowls by the Rous sarcoma virus and the accompanying variations of the virus, F. DURAN-REYNALS (*Cancer Res., 3 (1943), No. 9, pp. 569–577, illus. 11*).

The adequacy of improved stock diets for laboratory animals, C. A. SLANETZ (*Amer. Jour. Vet. Res., 4 (1943), No. 11, pp. 182–189*).

AGRICULTURAL ENGINEERING

Summary of records of surface waters of upper Columbia River Basin in Montana and Idaho, 1898–1938, A. H. TUTTLE and T. R. NEWELL (*U. S. Geol. Survey, Water-Supply Paper 916 (1943), pp. 216+*).—The summaries presented bring together data abstracted from 45 water-supply papers. A bibliography is included to facilitate reference to more detailed information for each station.

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[7] Calif. Dept. Agr. Bul., 23 (1934), No. 12, p. 364.

Floods of March 1938 in southern California, H. C. Troxell et al. (*U. S. Geol. Survey, Water-Supply Paper 844* (*1942*), *pp. 399+, illus. 66*).—This paper presents a detailed analysis of the factors involved in floods, apparently the greatest in the past 70 yr., which caused a loss of 87 lives and heavy property damage over a considerable part of southern California.

Sedimentation of sewage, R. E. Rostenbach and E. L. Waterman (*Sewage Works Jour., 15* (*1943*), *No. 3, pp. 453–465, illus. 5*).—The results of investigations made to determine the effects of certain factors on the efficiency of two primary clarifiers and one secondary clarifier, under actual operating conditions, are here recorded. The determinations were made at rates of flow of 1,200 and 2,000 gal. per minute.

The use of distribution vanes attached to the baffle around the clarifier feed pipe had no effect on the efficiency of the removal of suspended solids at the rates of flow used. The vanes did affect the distribution of suspended solids in the tank. The distribution of suspended solids in the secondary clarifier was quite different from the pattern found in the primary clarifiers. The variation in the chloride content of raw sewage was used to determine the flowing-through period in the primary clarifiers. For these units and for the rates of flow studied, the ratio of detention periods to flowing-through periods was 47.6 percent. In the secondary clarifier the ratio was 51 percent at the 1,200-gal.-per-minute rate, and 42.0 percent at the 2,000-gal.-per-minute rate. A salt method was used in the secondary clarifier work.

Mathematical formulation of the oxygen sag, W. E. Howland (*Sewage Works Jour., 15* (*1943*), *No. 3, pp. 512–520, illus. 1*).—Graphical methods now make it possible to apply the oxygen sag formula used by Streeter with slight modification, but with certain limitations, to a stream in which occurs not only biochemical oxidation of organic matter and reaeration but also sedimentation and adsorption and in which various constant proportional rates of oxygen utilization are induced by the sludge blanket. These methods constitute a direct (as against a purely cut-and-try) computation of the constants of the equation from appropriate experimental data. The equation and the methods for using it offer the possibility of mathematical formulation of artificial processes of sewage treatment.

Give 'em the gas, R. DeBaun (*N. J. Agr.* [*Rutgers Univ.*], *25* (*1943*), *No. 3, p. 9*).—The author points out the impossibility in actual farming practice of basing gasoline requirement estimates on the performance of an ideal tractor in perfect condition, operating under optimum load and driving. The discrepancy between such a figure and that representing what the farmer's tractor will actually do under practical operating conditions is often a wide one. The author gives some examples of situations likely to occur in practice in which departure from the rated efficiency will of necessity be large. He tabulates estimates of minimum and maximum gasoline consumption per acre in 10 common tillage-planting-harvesting operations.

Determining combine loss on the farm, C. B. Richey (*Ohio Sta. Bimo. Bul. 222* (*1943*), *pp. 133–136*).—In a simplified method here described a shallow pan of the correct size is thrown on the ground at the rear of the moving combine just ahead of the falling straw and chaff to catch what would normally fall on the area it covers. The straw is shaken over the pan to remove loose grain, and the chaff is winnowed. The grain collected is placed in a measuring container, and the relationship between the volume indicated in the measure and the area of the pan is such that the volume collected indicates bushels of grain lost per acre. It appeared that results secured with this new simple test should be reasonably accurate, especially if several checks are made; so that, at least, an excessive loss will be detected and the operator can change his adjustments until the loss is reduced.

Buck rake performance in hauling hay and grain bundles, C. B. Richey (*Ohio Sta. Bimo. Bul. 222 (1943), pp. 138–143*).—Time studies of various buck rake operations are tabulated and discussed. These operations included hauling timothy-clover hay under rough conditions and under smooth conditions and hauling wheat bundles to thresher under rough and under smooth conditions. For comparison, performance of team and wagon hauling wheat bundles to thresher is also shown.

Equipment for shredding sweet potatoes prior to drying for livestock feed, F. A. Kummer. (*Alabama Sta. Cir. 89 (1943), pp. 13, illus. 12*).—The machine described consists mainly of parts from the automobile rear axle assembly. A cutter disk 20 in. in diameter and 5/16 in. thick must be constructed, but the knives may be purchased from their manufacturer. The machine requires 5 hp. It was found capable of shredding up to 300 bu. per hour. Working drawings are included with the text.

Relative abrasion to spray nozzle discs by various fungicidal dust ingredients, J. D. Wilson (*Ohio Sta. Bimo. Bul. 222 (1943), pp. 146–155, illus. 1*).—The abrasiveness of these materials is very different, apparently depending on such variables as particle size, inherent hardness of the source material, and quantity (percentage) of still harder materials that may be present as impurities.

It was not practicable to test the abrasive action of this number of materials by determining the rate at which they would wear duster parts. Instead, the rate of wear on brass spray-nozzle disks by the different materials in water suspension (10 lb. in 100 gal. of water) was used as a measure of relative abrasion. The relative ranking of different materials by the two methods is roughly similar. The drilled office of the brass spray disk (1/32 in. thick) was 4/64 in. in diameter. The brass used had a Brinell hardness of 121 in contrast to a Brinell reading of 404 for a common type of steel disk. A pump pressure of 400 lb. was used in most of the tests. The rate at which water passed through the spray disks (about 3/4 gal. per minute) was taken as a measure of their original capacity. After they had been subjected to the action of the test material for a given period of time (30-120 min. in most instances) a second determination of the rate of water delivery was made. The percentage of increase over the original rate was taken as the measure of abrasive action.

The "talcs" were more abrasive than the "clays." Finely ground phosphate rock was very abrasive, and coarse whiting was much more abrasive than a finer grade. Gypsum was one of the least abrasive of the materials tested. Calcium arsenate and sulfur, sometimes used as supplemental materials, were mildly abrasive. The fixed coppers as a group were much less abrasive than the materials commonly used to dilute them, probably because of a smaller particle size (90 percent under 5μ compared with 90 percent over 5μ in most of the diluents) and the absence of any harder impurities in the copper-containing compounds. Bordeaux mixture was found to be less abrasive than any of the dust diluents except clay and possibly gypsum. There was little difference in abrasion between a high-calcium and a high-magnesium hydrated lime of comparable fineness. Bordeaux mixture prepared from these lime samples was less abrasive than the lime alone.

The construction and operation of an experimental dairy barn, I. D. Mayer and J. H. Hilton (*Indiana Sta. Bul. 483 (1943), pp. 16, illus. 16*).—The barn reported upon is (1) divided into separate units, minimizing fire hazard and improving sanitary arrangements; (2) provides for enlargement of any single unit independently of the others; (3) has a compact lay-out, minimizing herd handling labor; and (4) utilizes a new and experimental type of ventilation system. The construction afforded also an opportunity for testing the practicability of a concrete wall construction method new in the building of farm units.

The new type of wall consisted in the application of the concrete mix by compressed air to a single (inside) form and over a heavy reinforcement network. This reinforcing was supported 1½ in. from the wall form by small metal tubes bolted to the form. These tubes were threaded on the inside of one end so that ⅜-in. bolts could be placed through the wall form and screwed into the tubes. After the wall (3 in. thick) was completed and the form was removed, these tubes, the threaded ends flush with the inside face of the wall and the opposite ends flattened so that the tubes could not turn in the concrete, provided excellent fastenings for the furring strips which supported the insulation. The wall forms, constructed in sections and faced with hard, smooth-surfaced fiber board, were used several times but were thoroughly oiled with a paraffin oil before each use. They produced a smooth, dense inside face upon the finished wall. The concrete was applied in thin layers. The sand and cement were mixed dry before placing in the concreting machine. The machine, operated by a gasoline engine, metered the mixed sand and cement into an air line connected to a 1½-in. hose, which carried the material to the point of application. At the operator's end of the hose the material passed through a mixing nozzle to which the water supply was attached. Water under pressure was mixed with the sand and cement as it passed through the nozzle. The material, forced from the hose by an air pressure of approximately 50 lb. per square inch, struck the wall at high velocity, making a very dense concrete.

The new type ventilation system admits the fresh air through 12-in. vitrified tiles beneath the mangers, and inside the barn through inlets located in the front wall of the manger, bringing the fresh air in near the cows' heads but in such a way that there is no draft over them. Smoke tests showed this ventilation system to be satisfactory. The general efficiency of the building design was very good.

Poultry feed hoppers: Their construction and use, H. D. Polk (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 6, pp. 1, 3, illus. 5*).—Requirements which feed hoppers should meet are discussed, photographs of four types are reproduced, and bills of materials for these hoppers are included together with some discussion of their construction.

AGRICULTURAL ECONOMICS

[Papers on agricultural economics] (*Jour. Land and Pub. Util. Econ.*, *19* (*1943*), *No. 1, pp. 40–84, 94–98, illus. 2*).—Included are the following papers: Tenure Arrangements in Oklahoma Oil Fields, by R. D. Davidson and K. Wernimont (pp. 40–58) (U. S. D. A. coop. Okla. Expt. Sta.), discussing the situation, separation of surface and subsurface property rights, the adjustment of conflicting rights, clauses in deeds and leases, the implications of subsurface tenure arrangements, and the needed adjustments; Agricultural Finance Guides in Wartime, by D. C. Horton and H. C. Larsen (pp. 59–68) (U. S. D. A.); The Land Tenure Ideal, by C. H. Hammer (pp. 69–84) (Mo. Expt. Sta.), which includes as part of the conclusions that "existing programs emphasize cheap supervised credit and, while valuable, need to be articulated with an educational program to raise the level of competence of the low income section of the farm population [and] to achieve such an objective will apparently require not only Federal subsidies but a somewhat different tradition of education than has existed heretofore in the United States"; and Operating a Grazing Association, by A. F. Fulman and E. P. Ball (pp. 94–98) (U. S. D. A. et al.), discussing the administration and operation of the Crow Valley (Colorado) Cooperative Livestock Association.

[Economic and sociological studies in Ohio] (*Ohio State Univ. and Sta., Dept. Rural Econ. Mimeog. Bul. 135 (1940), pp. 37+, illus. 8; Dept. Rural Econ. and Rural Sociol. Mimeog. Buls. 145 (1941), pp. 45+, illus. 1; 146 (1942), pp. 16+; 157, pp. 31+*).—Mimeographed advance reports of the following studies previously noted: Nos. 135, Agriculture and Land Use as Affected by Strip Mining of Coal in Eastern Ohio, by H. R. Moore and R. C. Headington (coop. U. S. D. A.) (E. S. R., 84, p. 827); 145, Labor, Power, and Machinery on Small Farms in Ohio, by F. L. Morison and R. V. Baumann (coop. Ohio Expt. Sta. and U. S. D. A.) (E. S. R., 87, p. 868); 146, A Study of the Newer Hay-Harvesting Methods on Ohio Farms, by F. L. Morison (E. S. R., 88, p. 839); and 157, The Farm Labor Situation in Ohio (E. S. R., 89, p. 130).

[Papers and notes on land economics] (*Jour. Land and Pub. Util. Econ., 19 (1943), No. 2, pp. 153–179, 193–206, 231–242, illus. 2*).—Included are articles on Objectives of Area Analysis in the Northern Sierra Nevada, by D. Weeks (pp. 153–164) (Univ. Calif.); Land Tenure Policy Goals, by J. F. Timmons (pp. 165–179) (Univ. Wis.); A Recreational Livelihood Area, by G. S. Wehrwein and H. A. Johnson (pp. 193–206) (Univ. Wis. and U. S. D. A.); Effect of Land Purchase by FSA Standard Loan Borrowers on Agricultural Production in Northern Great Plains, by M. Solem (pp. 231–233) (U. S. D. A.); Tenure Status of New-Ground Settlers in Louisiana, by J. E. Mason and A. L. Bertrand (pp. 233–238) (U. S. D. A. and La. State Univ.); and Selective Selling and Leasing of County Land in North Dakota, by M. H. Taylor (pp. 238–242) (U. S. D. A.).

Farm realty changes in eastern and western United States, C. L. Stewart (*Econ. Geogr., 19 (1943), No. 2, pp. 196–205, illus. 6*).—Some of the findings in this study covering the period 1850–1940 were—the annual increase in the number of farms averaged 43,000 east and 38,000 west of the Mississippi River in 1850–1910. From 1910 to 1930 there was an average increase of nearly 15,000 farms in the western area and a decrease of over 18,000 in the eastern area. From 1930 to 1940 the East decreased nearly 3,000 farms per year, the decrease from 1935 to 1940 being 78,000 per year. In the west the average size of farm decreased from 300 acres in 1850 to about 150 acres in 1880 and then increased to 285 acres in 1940. The western farms in 1870 and 1880 were about 35 acres and in 1940 190 acres larger than the eastern farms. From 1860 to 1920 the average value per acre of the eastern farms was usually about $10 higher than that for the western farms. The average value of western farms rose from 111 percent of that of eastern farms in 1890 to 214 percent in 1920. The average value in 1940 was 62 percent of that in 1920 for eastern farms and 46 percent for western farms.

Land classification in Waldo County, Maine, A. E. Watson (*Maine Sta. Bul. 417 (1943), pp. 247–313+, illus. 3*).—The area—history, soils, topography, highways, and land use—is described. On the basis of the factors, land use, productivity rating, farm and building classification, soil types, and topography, the county was divided into six land classes, which are shown on a map and described. Sections are included on roads, electric and telephone service, and taxation. Typical town problems are discussed, and suggestions made for individual and group action in the improvement of economic and social conditions.

An economic classification of land: Blair County, Pennsylvania, W. E. Keepper. (Coop. U. S. D. A.). (*Pennsylvania Sta. Bul. 439 (1943), pp. 47+, illus. 15*).—The lands of the county are classified for agricultural use into five classes on the basis of present use, size and condition of buildings, topography, elevation, soils, and nearness to market. The intensity of farming in the county, the capacity for use of farm credit, and the assessed and appraised value of the land are discussed and suggestions made for adjustments.

The classification shows the following approximate distribution of the land: Class I, adapted primarily to forest and recreational use, 52 percent; class II, better fitted for forest and recreation but considerable farming existing, 13 percent; class III, largely agricultural but with medium-sized farms, fair crop yields, and dairying the major enterprise, 19 percent; classes IV and V, lands that will probably remain permanently in agriculture, 8 and 2 percent, respectively; and class R, used mainly for residential and commercial purposes, 6 percent.

Changes in the size of farming units in three land use areas of Hancock County, Ohio, 1937–40, R. C. Headington and J. I. Falconer. (Coop. U. S. D. A.). (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Bul. 148 (1942), pp. 31+, illus. 7*).—The changes in number and size of farms, why additional land was available, and the relation of size of unit to labor and equipment available are discussed.

Part-time farming in three land use areas of Columbiana County, Ohio, R. C. Headington and J. I. Falconer. (Coop. U. S. D. A.). (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Bul. 152 (1942), pp. 25+, illus. 1*).—In this study a "part-time" farm is defined as "a tract of 10 acres or more, producing in 1941 farm products with a retail value of $250 or more, where the head of the family either worked off the farm 150 days or more, or received 50 percent or more of the annual income from work off the farm." Data were obtained for 40 farms in the good area (suitable for and should remain in agriculture), 27 in the fair area (subject to serious erosion), and 17 in the poor area (not suited to agriculture). Analysis is made for each area of the resources and their use; the numbers, education, etc., of families and children; home facilities; and employment of operators and other members of the family off the farm.

Size of farm and output per farm worker in Ohio, F. L. Morison (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Bul. 160 (1943), pp. 17+*).—Data for 1942 (E. S. R., 89, p. 130) from approximately 500 farmers in 16 counties in the western, northeastern, and southwestern parts of the State are analyzed to show the effects of various factors on output per man. The effects of age of operators, size of family, and use of labor-saving machinery on labor efficiency are discussed. It was found that (1) average output per man is greater on large farms; (2) the labor on most large farms is being used to maximum efficiency; (3) the variations between efficiency in use of labor on the most efficient and on the least efficient farms were about the same on the large farms and on the small farms; and (4) the age of operator had considerable bearing on output.

A farm management study of farms with dairy enterprises in the Ogden area, Utah, 1937–39, G. T. Blanch and D. A. Broadbent (*Utah Sta. Bul. 308 (1943), pp. 48, illus. 1*).—This is the second bulletin in a series (E. S. R., 87, p. 733) on the study of the area from which whole milk is marketed in Ogden. It is based on 442 records for 186 farms obtained by surveys and from farm account books. The climate, water supply, transportation, markets, types of farming, etc., of the area and the conditions during the period studied are described. Analysis is made of farm capital, tenancy, indebtedness, size and value of farm, crops grown, farm receipts, expenses, and income, etc., and of the effects of size of farm, rates of production, value per acre of cropland, efficiency in use of labor, combination of enterprises, etc., on the financial success of the farm.

The labor earnings increased with size of farm business, with rates of production, efficiency in the use of labor, and intensive cropping. On small farms the keeping of more than the average number of cows and on small- and medium-sized farms an increase in animal units per acre increased average labor earnings. They increased consistently with the increase in the number of factors better than the average.

An economic analysis of the milking enterprise on farms in the Ogden area, Utah, 1937–39, G. T. BLANCH and D. A. BROADBENT (*Utah Sta. Bul. 309 (1943), pp. 41+*).—This, the third bulletin in the series noted above, is based on 452 records. It describes the milk enterprise—number of cows; investment; butterfat production; methods of disposal of dairy products; total receipts, expenses, and profits; labor requirements; and feed fed. Analysis is made of the returns per head and per cow and of the effects on costs and returns of such factors as number of cows, pounds of butterfat, hours of man labor, amounts of feed from grazing, hay, and concentrates fed per cow, seasonal sales of butter, and kinds of markets for butterfat.

The average cost per pound of butterfat was 42.2 ct., ranging from less than 30 ct. (16 farms) to over 70 ct. (11 farms). Returns per head of labor varied from 14.6 to 23.3 ct. for the 3 yr. The number of cows in the herd was not an important factor in financial success. Production per cow was the most important factor. Hours of labor spent in caring for cows had little relation to butterfat production per cow. As hours per cow increased the total cost per pound of butterfat increased and returns per hour of labor decreased. Feed cost was of major importance, as it constituted nearly 50 percent of the total cost.

Dairy cattle costs and returns in northwestern Indiana, L. ROBERTSON, L. E. SLATER, and V. C. MANHART (*Indiana Sta. Bul. 481 (1942), pp. 40, illus. 14*).—Analysis is made of the dairy enterprise and farm business records of 88 farms for 1940 and 104 farms for 1941 in the Chicago milkshed to show the feed and labor requirements, the costs and returns, including byproducts, profits in milk production, the cost of herd bulls and growing young cattle and veals, and the farm business of the dairy farms. The appendix describes the methods used in computing costs and returns, and includes tables showing the relation between various factors and milk production per cow, gross cost, value of byproducts, price of milk, size of herd, amount of concentrates and silage fed, and the average farm organization and results by type-of-farming areas.

The average annual amount of labor per cow was 124 hr. exclusive of hauling, grinding, and mixing feed, hauling manure, or hauling milk to market. The average annual costs per cow were $134.36. The average returns were milk (8,046 lb.), $147.88; manure, $7.38; and calf and hides, $7.36. Young cattle and veals did not pay for their cost. Highest profits per cow were associated with high quality of and milk production per cow, high value of byproducts, efficient feeding, economical use of labor, and high prices received for milk.

Cattle feeding as a method of marketing alfalfa on irrigated farms, H. B. PINGREY (*New Mexico Sta. Bul. 307 (1943), pp. 38, illus. 9*).—This report discusses the factors affecting the profitableness of cattle feeding, describes the methods of experienced feeders, analyzes the costs and returns for 64 feed lots studied during the feeding seasons from 1936–37 to 1940–41, and discusses the adaptation of cattle feeding to nonlivestock farms.

For the 5-yr. period, feeders received slightly more than the market price for roughage fed. The profit from feeding yearling and 2-year-old slaughter cattle was 29 ct. per head, not including the value of manure. The return per dollar's worth of feed was $1.01. Profit on Medium to Good grades of slaughter calves was $4.42 per head, and the return per dollar's worth of roughage was

$1.22. For slaughter and feeder calves the profit was $1.64, and the return per dollar's worth of feed was $1.30. Slaughter cattle of Common grade gave a profit of 26 ct. per head and $1.19 per dollar's worth of feed.

Poultry enterprise on upland farms near Douglas Reservoir, L. J. Fenske (*Tennessee Sta., Agr. Econ. and Rural Sociol. Dept. Monog. 154* (*1943*), *pp. 28+, illus. 8*).—Information was obtained for 19 flocks of less than 225 hens each by a survey in the fall of 1942. The farm organization and poultry enterprise in the area are described. Analysis was made of the investment in poultry, production, income, cost, returns, feed and labor required, price trends, and the efficiency factors.

Costs and returns from 453 family-sized sugar cane farms for the crop year 1940, with some comparisons for 1938 (*Louisiana Sta. Mimeog. Cir. 25* (*1942*), *pp. 27+*).—A farm management survey directed by J. N. Efferson, with a report prepared by P. S. Williamson, analyzes the costs and returns from 453 family-sized farms for the crop year 1940.

Adjustments for greater profits on small flue-cured tobacco farms, M. E. Brunk and C. M. Hampson (*Florida Sta. Bul. 387* (*1943*), *pp. 23, illus. 4*).—This study indicates how farmers can appraise and improve their businesses in the light of the experiences of other farmers. It is based on 186 farm records for 1939 obtained in connection with the development of a land-use planning program for Columbia County. It discusses the effects on farm returns of tobacco acreage and prices, labor efficiency and other factors, and how the business of one-mule and two-mule tobacco farms and the production of food for use in farm homes could be improved. The possibilities of increasing returns with different sized farms and different organizations are illustrated.

Washington apple production costs, 1939–43, M. T. Buchanan, A. W. Peterson, and G. A. Lee (*Washington Sta. Bul. 429* (*1943*), *pp. 11, illus. 1*).—Using survey records for 1942 obtained from 147 growers and special records from 18 to 30 growers for the years 1939, 1940, and 1941 in the Wenatchee-Okanogan and Yakima districts, analyses are made to show for the different years the costs per acre of growing, harvesting, packing, and storing apples. Estimates of the costs for 1943 "would fall within the range of $1.90 to $2.40 per box depending on the yield obtained."

The influence of forest management on the local economy of Dorchester, H. C. Woodworth and J. C. Holmes (*New Hampshire Sta. Cir. 66* (*1943*), *pp. 12, illus. 5*).—Using data gathered in surveys in 1932 and 1942, the changes in population, forest resources, nature of landholdings, tax rates, receipts and expenditures, and the possibilities for employment of residents are discussed.

Economic conditions and problems of agriculture in the Yakima Valley, Washington.—V, The Sunnyside Division of the Yakima project, W. McMartin. (Coop. U. S. D. A.). (*Washington Sta. Bul. 428* (*1943*), *pp. 48, illus. 6*).—This fifth number of the series (E. S. R., 88, p. 262) is based on the records of water use and crop census of the U. S. Bureau of Reclamation; records of irrigation and drainage assessments and payments for Yakima and Benton counties; and the irrigation payments to the Sunnyside Valley Irrigation District. The general plan of analysis follows that of the previous study of the Yakima-Tieton district (E. S. R., 85, p. 548). The history of the district is discussed, and analyses are made of the type and size of farms, the relation of tenure to size and type of farm and on farm operators, and the reclamation charges to individual farmers.

Operation and maintenance charges per acre irrigated in 1936 varied from an average of $1.73 (57 farms) to $14.65 (21 farms). The total investment per farm varied from $4,947 for crop-major-and-livestock farms to $8,243 for fruit-specialty farms, and the investment per irrigated acre from $120 for cash-crop-specialty farms to $375 for fruit-specialty farms. The proportion of irrigable land irrigated varied from 80 percent for farms with 3.0–15.9 acres irrigated to 90 percent for those with 101 acres or more irrigated.

Some ways of increasing net income are: Combination of irrigation and drainage districts; reallocation of construction and maintenance charges on a classification of the lands on the basis of productivity; increasing or decreasing size of farms operated and production of high-value crops; and more efficient farm organization and use of labor.

The northern plains in a world of change, C. F. Kraenzel, W. Thomson, G. H. Craig, et al. (*[Toronto?], Canada: Gregory-Cartwright, Ltd., 1942, pp. 190+, illus. 1*).—This study outline for adult groups in the northern plains of Canada and the United States is a preliminary report issued for experimental use. It is an outgrowth of conferences called by the Rockefeller Foundation at Lincoln, Nebr., and Saskatoon, Saskatchewan. The four parts, each of which is followed by discussion questions and projects, are: World Changes and the Plains Farms, The Uniqueness of the Northern Plains, Plains Agriculture at the Crossroads, and Challenge to the Plainsman. A bibliography is included.

Report of the United States Agricultural Mission to Saudi Arabia (*[Cairo, Egypt]: U. S. Agr. Mission to Saudi Arabia, 1943, pp. 147, illus. 1; Arab., pp. 192+, illus. 2*).—This report of the study made by the mission, consisting of K. S. Twitchell, A. L. Wathen, and J. G. Hamilton, deals with the agriculture, water supply, and irrigation of the country. The first part is a general report, and the second is made up of area reports.

Agriculture in the year ahead (*Washington, D. C.: Chamber Com. U. S., 1943, pp. 25*).—Included are the following papers delivered at a special session on April 27, 1943, of the thirty-first annual meeting of the Chamber of Commerce of the United States: Opening Remarks, by E. H. Sexauer (pp. 3–5); Production, by C. C. DuMond (pp. 6–10); Processing and Distribution, by C. Francis (pp. 11–14); Markets Abroad, by J. B. Condliffe (pp. 15–20); and Adjustment Problems, by E. R. Eastman (pp. 21–25).

[Food production and distribution] (*In United Nations Conference on Food and Agriculture, Hot Springs, Virginia, May 18–June 3, 1943: Final act and section reports. Washington: Govt., 1943, pp. 49–61*).—In addition to data noted on page 755, section 1 also considered the levels of consumption of nonfood agricultural products. The view was expressed that significant opportunities remained for raising the levels of consumption of these products and that research may be conducted to ascertain the effect of capacity of the world to consume specific products in the years ahead.

Section 2 considered the possibilities of expanding production and its adaptation to consumption needs. The short-term post-war period was characterized as one of shortage. The redirection of production to improve productivity and efficiency was recommended, including improved farming systems and practices, credit facilities, cooperative services, land-tenure systems, educational procedures, and research to solve problems which may prove barriers to best utilization of resources. Industrialization was indicated as the remedy for overpopulation.

In section 3, improved distribution and adequate consumption were indicated as answers to the problems of overproduction.

Using resources to meet food needs, R. P. Christensen (*U. S. Dept. Agr., Bur. Agr. Econ., 1943, pp. 71+*).—"This report considers in detail the relative efficiency of food products as sources of food. Efficiency is measured by the output of food nutrients obtained per unit of resources used. The procedure followed is to consider first the national average relationships of food output per unit of resources with present levels of production, the second the marginal relationships for certain changes from the present levels. Food output is measured in terms of food nutrients. As most of the data are national averages, applications to local areas should recognize differences between national and local resource-output relationships." It describes the war food production problem and procedure in making the analysis. The second section deals with food requirements in the period ahead, resource relationships in livestock production, resource relationships in crop production, resource relationships in vegetable and fruit production, and maximizing food output from limited resources.

Wartime farm and food policy, I–IV, VI–IX (*Wartime Farm and Food Policy Pams. 1 (1943), pp. 40+; 2, pp. 43+; 3, pp. 50+; 4, pp. 40+; 6, pp. 27+, illus. 2; 7, pp. 29+; 8, pp. 39+; 9, pp. 34+, illus. 3*).—This series of pamphlets prepared by the department of economics and sociology of Iowa State College "deals with the what, why, and how of agricultural policy and food management." No. 1, Food Strategy, by M. G. Reid, "sets forth the broad problems which call for the immediate attention of the Food Administrator and the citizens." No. 2, Farm Prices for Food Production, by T. W. Schultz, "starts from production requirements and works out from them to determine the needed changes in farm prices." No. 3, Manpower in Agriculture, by R. Schickele, discusses the policy that should be pursued "regarding draft deferments, farm wages, recruiting city volunteers, and increasing food production per worker on the millions of small-scale farms." No. 4, Food Rationing and Morale, by C. A. Anderson, "stresses the importance of morale in wartime and outlines the essentials of a food rationing program that will maintain a high level of morale." No. 6, Commodity Loans and Price Floors for Farm Products, by G. Shepherd, "deals with the agricultural price controls that now rule the markets for farm products." No. 7, Using Our Soils for War Production, by A. C. Bunce (coop. U. S. D. A.), "deals with the problem of how we can get the most out of our soil resources and at the same time avoid serious losses through erosion. The dominant theme is the development of a unified production and conservation program in agriculture." No. 8, Food Management and Inflation, by M. J. Bowman and A. G. Hart, "takes up not only the effect of food management in stimulating or checking inflationary rises in the money incomes of farmers, food distributors, and laborers, but also the handicaps imposed on food management by leaving consumers with a huge excess of spending power over supplies of consumption goods." No. 9, Land Boom Controls, by W. G. Murray, "points out two dangerous elements in the present land situation, the beginnings of a land boom, and an invasion of the land market by nonfarmers. Three control measures are proposed—credit restrictions, taxation, and purchase permits."

Wartime agricultural production adjustments in Ohio, J. I. Falconer, F. L. Morison, and G. T. Schaefer. (Coop. U. S. D. A.). (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Bul. 151 (1942), pp. 36+, illus. 1*).—Included are estimates of crops and livestock and livestock products in 1943 and the potential production of vital war commodities. The amount and nature of increased production is discussed. The estimates are based on a study of nine sample counties in different parts of the State.

The wartime economic situation of New York fruit growers, W. I. Myers (Cornell Univ.). (*N. Y. State Hort. Soc. Proc., 88 (1943), pp. 92–96*).—A wartime program for New York farmers was suggested, which included producing the maximum of essential foods, reducing excessive debts to a safe basis, and investing in war bonds to build a financial reserve.

War-time motortruck transportation of fresh fruits and vegetables, Northern Ohio Food Terminal, Cleveland, Ohio, October 12–November 7,

1942, C. W. HAUCK and J. K. SAMUELS (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Bul. 158 (1942), pp. 31+, illus. 3*).—This is a preliminary report of a study previously noted (E. S. R., 89, p. 389).

Wartime transportation of fruits and vegetables grown in Idaho, Oregon, and Washington, F. A. QUITSLUND (*U. S. Dept. Agr., Farm Credit Admin., 1942, W. C. 3, pp. 30+*).—A table shows the 1941 commercial production in each State and the United States of different fruits and vegetables. The motor and rail transportation needs for potatoes and tree fruits in Idaho and the needs for transportation from the growers and from the processors to the market are discussed for tree fruits, canning and freezing fruits and vegetables, and fresh fruits for Oregon and Washington.

A survey of methods of delivering cannery tomatoes, F. C. GAYLORD and K. I. FAWCETT. (Ind. Expt. Sta.). (*Canner, 97 (1943), No. 4, pp. 12–13, 24, illus. 5*).—The results are reported of a study during the winter of 1942–43 of the advantages and disadvantages of unloading tomatoes direct into the washer, stacking in the yard until needed at the washer, and delivering by appointment.

Reducing livestock truck mileage, A. A. DOWELL (*Minnesota Sta. Bul. 369 (1943), pp. 31+, illus. 10*).—This study is concerned primarily with truck operating efficiency as measured by size of load hauled and as related to normal carrying capacity, length of trips, weight of livestock hauled per mile, and overlapping trips and territories. It does not make a study of operating costs or relative efficiency of various sizes and types of trucks, private farm trucks, private business trucks for town delivery, and trucks used chiefly or entirely for hauling cream, eggs, poultry, or petroleum. Data for the 123 commercial trucks in Martin County for one week, August 2–8, 1942, were obtained in cooperation with the Minnesota Extension Service and local civic organizations. The size, age, capacity, mileage, number of trips, livestock and other products hauled, number of pick-up stops, size of loads, return loads, overlapping trips, crosshauling, etc., are discussed. Specific and alternate suggestions for improving truck efficiency are outlined.

Country transportation of milk in selected areas of Ohio, 1942, R. W. SHERMAN (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Bul. 165 (1943), pp. 26, illus. 2*).—This study is based on information obtained in a survey made in the summer and fall of 1942 of the transportation of milk from farms to dealers' platforms in Columbus, Cleveland, Canton, and Portsmouth, and Carroll County. Analysis is made of the possible savings in number of trucks, mileage, etc., through rerouting, reducing plant stops, increased size of loads, etc.

The distribution of fluid milk in New Orleans, W. H. ALEXANDER and R. A. BALLINGER (*Louisiana Sta. Mimeog. Cir. 32 (1943), pp. 25+, illus. 6*).—The volume of milk delivered, condition of trucks and tires, delivery vehicles, time required for delivery, length and reorganization of delivery routes, and the duplication of steps are discussed.

[Effect of every-other-day delivery on milk purchases], K. M. KEITH and C. G. MCBRIDE (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Buls. 162 (1943), pp. 18+, illus. 1; 163, pp. 18+, illus. 1; 164, pp. 17+, illus. 1*).—These are studies of changes in milk delivery in Columbus (No. 162), Stark County (No. 163), and Dayton (No. 164). They are based on interviews with 505, 583, and 540 housewives; 75, 35, and 30 store managers; and 9, 15, and 16 milk distributors in the respective areas.

[Farm sales of Ohio milk through different outlets], III–VIII, C. G. MCBRIDE and R. W. SHERMAN (*Ohio State Univ. and Sta., Dept. Rural Econ. Mimeog. Bul. 131 (1941), pt. 3, pp. 25+, illus. 5; (1942), pts. 4, pp. 29+, illus. 5; 5, pp. 25+, illus. 5; 6, pp. 28+, illus. 5; 7, pp. 22+, illus. 5; 8, pp. 30+, illus.*

5).—This is a continuation of the series previously noted (E. S. R., 86, p. 546), No. 3 covering the Toledo and northwestern Ohio area (Defiance, Fulton, Hancock, Henry, Lucas, Ottawa, Paulding, Putnam, Sandusky, Seneca, Williams, and Wood Counties); No. 4, the Dayton-Cincinnati area (Butler, Champaign, Clark, Clermont, Clinton, Darke, Greene, Hamilton, Miami, Montgomery, Preble, and Warren Counties); No. 5, the south-central Ohio area (Adams, Athens, Brown, Fayette, Gallia, Highland, Hocking, Jackson, Lawrence, Meigs, Pike, Ross, Scioto, and Vinton Counties); No. 6, the west-central Ohio area (Allen, Ashland, Auglaize, Crawford, Hardin, Huron, Knox, Logan, Marion, Mercer, Morrow, Richland, Shelby, Van Wert, and Wyandot); No. 7, the southeastern Ohio area (Belmont, Coshocton, Guernsey, Harrison, Jefferson, Monroe, Morgan, Muskingum, Noble, Perry, and Washington Counties); and No. 8, the northeastern Ohio area, Ashtabula, Cuyahoga, Erie, Geauga, Huron, Lake, Lorain, Mahoning, Medina, Portage, Summit, and Trumbull Counties).

Retail outlets for fruit in New York City, M. P. Rasmussen, F. A. Quitslund, and E. W. Cake. (Coop. Cornell Univ.). *U. S. Dept. Agr., Farm Credit Admin., Bul. 52 (1941), pp. 120+, illus. 27).*—This is the first of a series dealing with retailing of fruits. Three separate but related studies were made covering the sales during August and November 1939 and March 1940, in which data were gathered from 1,516 to 1,543 independent grocers, chain groceries, fruit and vegetable stores, meat markets, push carts and market stalls, and wagon or motor hucksters in four large boroughs of New York City. In the analysis the data were classified by income areas—low, medium-low, medium-high, and high—and by types of outlet. Tables and charts are included and discussed showing the tonnage and value of fruits sold, number of items handled, prices, gross margins, availability of different fruits, apple sales, spoilage, credit and delivery services, varieties and grades of apples, quality of fruit, etc.

Of approximately 38,500 retail food outlets in the city, about 43 percent handled fresh fruits and vegetables, and about 33 percent handled fresh fruits in August 1939. On the basis of weekly dollar sales independent fruit and vegetable stores handled 33–40 percent of the total sales; independent grocery stores, 21–28 percent; chain grocery stores, 10–15 percent; hucksters, 7–16 percent; push carts and market stalls, 6–14 percent; and independent meat markets, 5–6 percent, depending on the season. Sales of canned fruits and canned fruit juices were about one-fifth as great as those for fresh fruits in August and November, and one-fourth as great in March. Gross retail margins varied greatly among the different fruits, from season to season, between income groups, and among the types of retail outlets. There was no usual percentage. "Loss sales" occurred to about the same extent in all the types of outlets. During November and March, families in high-income neighborhoods bought approximately twice the number of pounds of fruit weekly as did those in low-income areas. In March, families in low-income areas spent about 28 ct. per week for fresh fruit as compared with 87 ct. in high-income areas. Average prices per pound in low-income areas were 1–2 ct. less than in high-income areas and ½–1 ct. less than in medium-income areas. Credit service and delivery service were available in about 50 percent of the retail outlets. Each fruit competed with a large number of other food and nonfood items. Retailers handled 22 varieties of eastern apples in August, 33 in November, and 27 in March, but 7 or 8 varieties accounted for 87–90 percent of the tonnage. In all areas families used about the same quantity of dessert apples, but sales of cooking varieties were relatively small in the low-income areas.

Retail pricing of fruit, F. A. Quitslund and M. P. Rasmussen (*U. S. Dept. Agr., Farm Credit Admin., 1943, W. C. 8, pp. 53+, illus. 30*).—This study is based on the data obtained in the study noted above. It analyzes and discusses retail pricing methods; average prices of apples, oranges, and grapefruit; the relation of prices to quantities sold and to size of business; the relation of unit of sale to quantity sold; and weekly gross margins; and compares sales and prices in the leading types of outlets in low, medium, and high income areas, and the prices of different grades, brands, etc., of apples.

Fruit and vegetable sales in selected retail stores (Cincinnati, Ohio), C. W. Hauck and J. K. Samuels (*Ohio State Univ. and Sta., Dept. Rural Econ. Mimeog. Bul. 160 (1942), pp. 32+, illus. 3*).—This is a preliminary report of a study previously noted (E. S. R., 88, p. 394).

An experiment with retail sales of high and low grades of apples, C. W. Hauck and J. K. Samuels (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Bul. 150 (1942), pp. 20+, illus. 4*).—A preliminary study was made in the fall of 1941 of six Cincinnati retail stores handling both U. S. No. 1 apples and lower grades, followed by a study of 10 stores in the winter of 1941–42. Some study of the competition between fresh apples and apple products was made in eight additional stores.

The offering of Utility grade apples did not diminish sales of U. S. No. 1 grade. Withdrawal of Utility grades resulted in a loss of total sales approximately equal to the volume of such apples previously sold. Where both grades were sold the proportions were approximately two-thirds No. 1's and one-third Utility grades. Retailers' margins average 31.2 percent of sales value on No. 1 and 24.8 percent on Utility grades. Special promotion of apple products for a week increased sales somewhat during the week and also the week following and decreased the volume of fresh apples sold.

Marketing and pricing eggs in Kentucky, J. B. Roberts (*Kentucky Sta. Bul. 441 (1943), pp. 40, illus. 16*).—The Kentucky egg industry, general marketing practices, markets for Kentucky eggs, buying eggs at country points, marketing competition, general price relationships, price relations between markets, establishing egg prices, and the farm price of eggs are discussed. "Constructive steps toward increased returns to egg producers in Kentucky include, in most cases, the selection of strains of chickens to increase egg size, fewer breeds so that eggs will be more uniform in size and color, and the production of clean eggs, undamaged by heat or freezing."

Rehabilitation of low-income farmers: A list of references, J. M. McNeill (*U. S. Dept. Agr., Libr. List 6 (1943), pp. 56*).—Included are 257 annotated references grouped as general, low-income rural population, rural problem areas, consumption behavior of low-income rural families, public rural rehabilitation programs, and rural rehabilitation programs other than public.

War relocation of subsistence farmers to areas of farm labor needs in Ohio, A. R. Mangus. (Coop. U. S. D. A. et al.). (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Bul. 161 (1943), pp. 24+, illus. 2*).—This is a study of 214 farm workers from the Appalachian highlands of Kentucky, relocated November 1942 to March 1943 by the station, the U. S. D. A. Farm Security Administration, and the U. S. Employment Service, in a program of controlled movement of people to meet the needs of farm labor in Ohio. It describes and discusses the recruitment and replacement areas; the characteristics of the workers placed—age, present occupation, size of household, school grade attainment, health, intelligence rating, etc.; and makes appraisal of the program.

Rural underemployment and land use in a marginal agricultural area of West Virginia, R. H. Bradford and E. C. Weitzell. (Coop. U. S. D. A.). (*West Virginia Sta. Mimeog. Cir. 48 (1943), pp. 23+, illus. 4*).—This study was made to ascertain the degree of underemployment in a representative marginal area and the feasibility of adujustment, and to appraise the possibilities of combining small inefficient farm units. Data were gathered from 102 family units in

Braxton County. In the analysis the farm units were grouped into (1) those with gross farm sales of at least $1,000; (2) those with cash sales less than $1,000, but nonfarm income of at least $600; (3) units not included in (1) and (2), with operators over 59 yr. of age; (4) those not included in (1) and (2), with operators under 60 yr. of age; and (5) abnormal units not included in the other groups. Analysis is made by groups of size of farms, land use, production units, cash income from different sources, crop and animal production in 1942 and estimated for 1943, machinery per farm, age of operators and children, migration from the farms in 1942, underemployment in group 4, etc., and the possibilities for more efficient utilization of land and labor through consolidation of farms.

The authors conclude that "an appreciable volume of underemployment exists on the small subsistence farms of West Virginia. A significant number of those who are underemployed will move to better opportunities, both farm and nonfarm. A definite and acceptable job proposition is essential to effectuate successful labor migration. The prevailing underemployment and low incomes center in problems of small farm units and low-quality land. . . . Public encouragement to migration and public assistance in making desirable adjustments in land utilization may be necessary; undoubtedly they would be justified in terms of individual and social welfare."

Agricultural labor in the United States, July 1941–February 1943: A list of references, R. W. Moats and J. M. McNeill (*U. S. Dept. Agr., Libr. List 4 (1943), pp. 59+*).—An annotated list of 289 references, compiled in cooperation with J. C. Folsom, supplements previous lists (E. S. R., 87, p. 288).

War labor supply and farm production on eastern Kentucky farms, J. H. Bondurant et al. (Coop. U. S. D. A.). (*Kentucky Sta., 1943, pp. 23+, illus. 5*).—In a study of 350 representative farm families in five counties of eastern Kentucky, it was found that as of December 1, 1942, 35 percent of the heads of families were already productively employed and 30 percent were classified as not able to work elsewhere. Thirty-five percent were estimated to be "potentially available for employment elsewhere." The per-family farming accomplishment of those classified as "potentially available for employment" averaged only about as much as would be done by 52 days work yearly in the better agricultural areas of the State, and none of these families accomplished more than would be done in 120 days work yearly in the better agricultural areas.

Labor requirements to meet 1943 agricultural production goals in Utah, D. A. Broadbent, G. T. Blanch, and W. P. Thomas (*Utah Sta. Mimeog. Ser. 291 (1943), pp. 39*).—Tables show the production labor requirements by months per acre or per head of different crops and kinds of livestock; the annual requirements for fruits, truck crops, field crops, and livestock, both by commodities and by counties; and monthly requirements for totals and by county for different crops and kinds of livestock.

Farm labor available in an urban center: Washington, North Carolina, S. C. Mayo and C. H. Hamilton (*North Carolina Sta. Prog. Rpt. RS-1 (1943), pp. 14+, illus. 1*).—This survey reveals that there are approximately 2,380 Negroes 10 or more years of age in Washington, N. C. Of this number 1,480 have had some farm experience, and 1,220 are available for farm work. However, 1,200 persons with farm experience are not now working on a farm; 440 persons who worked on a farm last year are not now working on a farm; 810 persons are not now employed at any paying jobs; 500 more persons are available for farm work than worked on a farm last year; 260 fewer people are available for farm work than have had farm experience. It is believed that a female farm labor recruiter should be tried; that nursing or child caring services should be provided for town mothers doing or willing to do farm work; that groups of farmers needing town labor should get together and work out satisfactory housing and transportation standards and arrangements; and that a more concerted attempt should be made to inform town leaders, white and Negro, accurately as to the need for farm labor in critical seasons.

Sharing earnings and management to hold workers on farms, O. R. JOHNSON (*Missouri Sta. Cir. 272* (*1943*), *pp. 12*).—Sharing earnings without management responsibility and various possible agreements between father and son and nonrelated young men and the furnishing of residence, livestock, etc., by landlords are discussed. The conclusions reached are that returns should be divided on the basis of contributions made; results of accounting work may be used as preliminary guides in drawing up agreements; sharing administrative responsibility is a highly useful means by giving young persons experience; and giving efficient workers an interest in the business can make farm proprietors much more successful in competing with other kinds of employment.

Effect of age and sex on productive capacity at farm work, C. F. REUSS (*Washington Sta. V Cir. 13* (*1943*), *pp. 4*).—From an analysis of a random sample of farmer evaluations in eight counties of the State, the author concludes that "men between the ages of 18 and 44 make the most capable farm workers. Boys below the age of 18, although advancing rapidly toward peak farm labor effectiveness, are from one-third to three-fourths as capable at farm work as men within the ages 18 and 44. Men past 45, and especially men past 55 yr. of age, are beginning to decline in efficiency as farm workers. Women are only about one-fourth as effective at farm work as men. Even those women who are counted on regularly for farm work are only about half as effective as an able-bodied man for the average run of farm work."

Notes on using inexperienced labor on Ohio farms, H. R. MOORE (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Bul. 167* (*1943*), *pp. 17+*).—The kinds of inexperienced help, methods of recruiting, transportation, meals and housing, systems of payment, systems of instruction and supervision, hours of employment, etc., are described.

How tractors change farm labor and work stock organization in the Delta cotton area, H. G. PORTER and R. J. SAVILLE (*Louisiana Sta. Mimeog. Cir. 29* (*1942*), *pp. 10+, illus. 5*).—An increase in the number of tractors, 1929–38, inclusive, and the relation of the changes to size of farms, kinds of operations, and the replacement by tractors of families and work stock are discussed.

Labor and material requirements for crops and livestock.—I, A general farming area in Florida, M. E. BRUNK and J. W. REITZ (*Florida Sta. Bul. 388* (*1943*), *pp. 28*).—Estimates were obtained from farmers in Madison and Jackson Counties of the material requirements and labor requirements (by 2-week periods per crop) for different practices used in the production of different crops and different kinds of livestock. Tables show the common operations for different crops, the usual period of performance, and the man- and mule-hours per acre, and for the different kinds of livestock, the man-hours required and acres of different feed crops needed. Man and mule requirements by ½-mo. periods are shown for the different crops. Standards for the reorganization of farms are presented, and their use is illustrated.

Forms for use in developing a farm plan (*Ohio State Univ. and Sta., Dept. Rural Econ. Mimeog. Bul. 134* (*1940*), *pp. 20+*).—Included are suggested forms for use by farmers in appraising and reorganizing their farm businesses.

Some economic aspects of farm planning for soil and water conservation, Mount Vernon, Ohio, R. H. BLOSSER. (Coop. U. S. D. A.). (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Bul. 154* (*1942*), *pp. 23+, illus. 2*).—The area, the program recommended by the U. S. D. A. Soil Conservation Service, and the problems in changing rotations and in contour strip cropping, contour cultivation, and pasture and woodland improvement are discussed.

Some economic considerations involved in planning farms for soil and water conservation at Wooster, Ohio, R. H. Blosser. (Coop. U. S. D. A.). (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Bul. 147 (1942), pp. 37+, illus. 4*).—The area and the program recommended by the U. S. D. A. Soil Conservation Service and its probable economic effects are described. Case studies are made for an 80-acre and a 155-acre farm with heavy soil and an 80-acre and a 167-acre farm with light soil.

The Licking County experimental agricultural conservation program in 1940, F. L. Morison and B. R. Hurt. (Coop. U. S. D. A.). (*Ohio State Univ. and Sta., Dept. Rural Econ. Mimeog. Bul. 136 (1941), pp. 30+*).—"Under the experimental program, cropland-conserving payments offered Licking County farmers were not proportional to acreage allotments and soil-building goals. Instead, they were proportional (1) to the number of points the 'productivity balance value' for the cropland in the farm at the end of the current year was above an established point on the 'productivity balance value scale,' and (2) to the improvement in productivity balance value in the current year. Soil productivity maintenance or improvement practices included both land use and treatment practices."

Conditions influencing farmer response to money payments for soil-building practices, R. J. Saville (*Louisiana Sta. Mimeog. Cir. 20 (1942), pp. 12+, illus. 1*).—A brief discussion of the subject previously noted (E. S. R., 88, p. 396).

Estimated gross cash income from the sale of agricultural products from the farm, and from Agricultural Adjustment Administration payments for Ohio farms, by counties—1940 and 1941, J. R. Kendall and J. I. Falconer (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Bul. 155 (1942), pp. 22+*).—The estimates are presented in tables and continue the series previously noted (E. S. R., 84, p. 259).

Agricultural Finance Review, [May 1938–November 1942] (*U. S. Dept. Agr., Bur. Agr. Econ., Agr. Finance Rev., 1 (1938), Nos. 1, pp. 82+, illus. 14; 2, pp. 112+, illus. 8; 2 (1939), Nos. 1, pp. 96+, illus. 3; 2, pp. 107+, illus. 10; 3 (1940), Nos. 1, pp. 89+, illus. 11; 2 pp. 98+, illus. 17; 4 (1941), Nos. 1, pp. 84+, illus. 9; 2, pp. 97+, illus. 3; 5 (1942), pp. 103+, illus. 7*).—These discuss current developments and research in the field of farm credit, farm insurance, and farm taxation.

Farm credit in Aroostook County, Maine, C. H. Merchant (*Maine Sta. Bul. 418 (1943), pp. 315–394+, illus. 10*).—This bulletin is based on data for 459 farms obtained in cooperation with U. S. D. A. Farm Credit Administration and the Aroostook County Council and on interviews with farmers during the fall of 1937 and summer of 1938. Analysis is made of the indebtedness of the farmers, equity in their farms, first and second farm real estate mortgages, amounts and sources of production credit, etc. The loan requirement practices and experiences of the different Federal and local agencies are described and discussed. Other sections of the bulletin deal with the agriculture of the county, potato prices, farm income, property values, and costs and returns in the production of potatoes.

The survey showed 81 percent of the farmers indebted. The average indebtedness per farm was $4,763, of which 77 percent was farm real estate mortgages, 19 percent production loans, 1 percent delinquent taxes, and 3 percent delinquent interest.

Attitudes of farmers toward some sources and conditions of short-term farm credit, P. S. Eckert (*Ohio State Univ. and Sta., Dept. Rural Econ. Mimeog.*

Bul. 137 (1941), pp. 20+).—Data obtained in a survey of 103 farms in Fairfield Township, Huron County, Ohio, in August 1940.

Ohio farm real estate taxes and tax valuations, H. R. Moore (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Bul. 159 (1943), pp.* [8], *illus. 1*).—Tables and charts show the average taxes per acre for selected years, 1910–41, of farm real estate and, by counties, the taxes, census values, and tax valuations, 1940, of owner-operated farms.

Farm tenancy areas in Ohio, I. W. Moomaw. (Coop. U. S. D. A.). (*Ohio State Univ. and Sta., Dept. Rural Econ. Mimeog. Bul. 144 (1941), pp. 26+, illus. 19*).—This preliminary report describes briefly the agricultural conditions in the State and discusses for the State as a whole and by areas the characteristics of farm tenancy and size and value of tenant farms.

Material bearing on parity prices (*U. S. Dept. Agr., Bur. Agr. Econ., 1941, pp.* [87], *illus. 18*).—The material was presented by H. R. Tolley at a hearing before a subcommittee of the U. S. Senate Committee on Agriculture and Forestry in July 1941. The legislation relating to parity is summarized. Tables and charts present data as to national income, farm income and expenses, prices received and paid by farmers and wholesale prices, and income of typical family-operated farms by regions. Examples of methods that might be used in computing parity prices are discussed.

Net farm income and income parity summary, 1910–42 (*U. S. Dept. Agr., Bur. Agr. Econ., 1943, rev., pp. 29+, illus. 5*).—The estimated incomes noted above are brought up to date.

Estimated lags between farm, wholesale, and retail prices for selected foods, H. W. Little and A. L. Meyers (*U. S. Dept. Agr., Bur. Agr. Econ., 1943, pp. 16+, illus. 9*).—Tables and charts are included and briefly discussed for pork, beef, dairy products, potatoes, canned tomatoes, canned peas, eggs, oranges, and bread. The method of analysis used and alternate methods are described.

Annual prices received by farmers, sixteen selected products, by type-of-farming areas in Louisiana, 1934–42, J. P. Montgomery (*Louisiana Sta. Mimeog. Cir. 33 (1943), pp. 16+, illus. 1*).—Tables giving the average annual prices by years 1934–42, inclusive, in each of the nine type-of-farming areas of the State.

Seasonal price variation and economy of feeds in Indiana, E. G. Byer and E. L. Butz (*Indiana Sta. Bul. 484 (1943), pp. 31, illus. 38*).—Using the prices reported in *Crops and Markets*, tables and charts are presented showing for 29 feeds from January 1932 to December 1941, inclusive, and for 5 feeds from May 1933 to April 1942 indexes of average annual prices and monthly average prices for each commodity; the pounds per hundredweight of digestible protein, total digestible nutrients, and nonprotein nutrients; average annual and monthly variations in the indexes of economy in the use of different feeds; and the cost of different feeds at various prices. An appendix includes formulas of mixed feeds.

Statistics of farmers' marketing and purchasing cooperatives, 1941–42 marketing season, R. H. Elsworth and G. Wanstall (*U. S. Dept. Agr., Farm Credit Admin., Misc. Rpt. 64 (1943), pp. 28, illus. 3*).—Statistics are included on number of associations, membership and stockholders, volume of business, significant changes, business in different products, importance of cooperative groups, etc.

Farmers' cooperative associations in Florida.—V, Citrus cooperatives; trends in financial structure and services; and factors determining success or failure, H. G. Hamilton and A. H. Spurlock (*Florida Sta. Bul. 386 (1943), pp. 88, illus. 15*).—This fifth bulletin of the series (E. S. R., 83, p. 121) is based on data for the seasons 1925–26 to 1939–40, inclusive. Analyses are made and discussed of the significance of the changes in citrus cooperative marketing associations, 1926–27 to 1939–40; the corporate structure of cooperatives; prices received by and cost of packing of the associations; cost of and factors affecting credit; grove caretaking by associations; precooling and packing practices; and the factors determining the success or failure of cooperatives. The Florida Citrus Exchange and other cooperatives are described.

Part of the conclusions are that generally, for efficient operation, a citrus marketing association needs 200,000 boxes of fruit; financing of fixed assets can be accomplished satisfactorily with capital stock or certificates of indebtedness; grove caretaking is an important function of the associations; high prices received for fruit, low cost of packing, and large volume of fruit are closely interrelated; usually one year of low prices does not cause failure of an association; large members' equity in assets enables the associations to borrow at low rates of interest; and seasonal polling except for early fruit seems to be most satisfactory.

The Kaw Valley Potato Growers' Association, 1930–36, F. L. Parsons. (Coop. U. S. D. A.). (*Kansas Sta., Agr. Econ. Rpt. 18 (1943), pp.* [*48*]).—The development and nature of the Kaw Valley Potato Growers' Association and the National Fruit and Vegetable Exchange are described. The pooling system of the Kaw Valley Association; the pooling operation in different years; the opinions of members and nonmembers; the distribution of the sales; type of sales; methods of selling; and type, sources, and quality in 1935 and 1936 are analyzed and discussed. The appendix includes copies of bylaws and membership agreement of the Kaw Valley Association.

Wartime supply operations of Kansas and Oklahoma marketing cooperatives, G. M. Francis (*U. S. Dept. Agr., Farm Credit Admin., 1943, W. C. 6, pp. 14+, illus. 1*).—The findings in a survey in the winter wheat belt of Kansas and Oklahoma to determine the general effects of the war and to assist associations in making necessary adjustments are reported.

More manpower for cooperative food processors, H. C. Hensley and A. L. Gessner (*U. S. Dept. Agr., Farm Credit Admin., 1943, W. C. 7, pp. 9+, illus. 2*).

Financial operations of Ohio farmer owned elevators, [1940–41 and 1941–42], B. A. Wallace (*Ohio State Univ. and Sta., Dept. Rural Econ. Mimeog. Buls. 143 (1941), pp. 22+; 156 (1942), pp. 20+*).—Continuations of the study previously noted (E. S. R., 84, p. 541).

Progress of free classing and market news service for members of cotton improvement groups in Louisiana, H. W. Little and R. A. Ballinger. (Coop. U. S. D. A.). (*Louisiana Sta. Bul. 362 (1943), pp. 38*).—The data for the first part of the report, dealing chiefly with the groups and the relation of certain factors to their success, were obtained from the U. S. Department of Agriculture and the officers of 42 of the 46 groups that applied for services during the 1941–42 cotton season. Those for the second section, dealing with the benefits received, are based on information from 125 members of groups. The program and its progress in Louisiana and other Mississippi Valley States under the Federal Smith-Doxey Act of 1937, providing for furnishing free official classifications and market news to organized cotton improvement groups, are described. Analysis is made for the Louisiana groups of membership, acreage, production, varieties and quality of cotton produced, agencies cooperating in sampling, place of sale and delivery, relationship of ginner buying to use of the services, members' knowledge of marketing conditions, attitude of local buyers, and the factors related to usefulness of the service—members' ability to classify, proportion of cotton submitted for classification and cotton sold before classification, availability of classification service from other sources, buyers' reactions to the program, availability and use of market news, effect of classification on prices, etc.

The cooperative movement in Latin America: Its significance in hemisphere solidarity, A. Fabra Ribas, trans. by A. Light (*Inter-American [Univ. N. Mex.], Short Papers No. 3 (1943), pp. 62+*).—This paper discusses the development, present status, and future of the cooperation in Latin America, with chapters on cooperative education, the first stage of a plan, and the cooperative order.

Vegetable oil mill crushing capacity and estimated crush, 1943–44 season, E. G. Schiffman (*U. S. Dept. Agr., Farm Credit Admin., 1943, W. C. 4, pp. 6+*).—Tables are included and briefly discussed showing by States for cottonseed, flaxseed, peanuts, and soybeans the suggested acreages in 1943, average yields, estimated quantities available for crushing and for other purposes, the crushing capacity of mills, and the estimated production of oil and meal.

Farm accidents in Ohio: Their nature, causes, and costs, G. E. Ferris and J. I. Falconer (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Bul. 166 (1943), pp. 12+*).—Analysis is made of the nature, cause, and cost of 395 farm and home accidents reported on 4,976 farms by 1,634 vocational agricultural students in 104 high schools in 48 of the 88 counties of the State.

The accidents from different causes were machinery 87, falls 73, animals 53, hand tools 42, falling or flying objects 30, stepping on injurious objects 20, motor vehicle traffic 17, and miscellaneous 73. Sixty-seven resulted from recreational activities, 29 in the home, and 48 to women and girls. For 386 accidents the age of victim reported was 10 yr. or less 34, 11 to 20 yr. 153, 21 to 30 26, 31 to 40 47, 41 to 50 52, 51 to 60 48, 61 to 70 21, and over 71 yr. 5. A doctor was required in 299 cases. The average fee (257 fees) was $20.02. A nurse and medicine were required for 83 cases at an average cost of $19.06. Forty-six cases required hospitalization at an average cost (38 reports) of $61.32. Fifteen accidents resulted in permanent partial disability, 2 in total disability, and 8 in death. Costs of substitute hired help (61 cases) was from $2 to $175, averaging $31.27 (45 reports).

RURAL SOCIOLOGY

The impact of the war on rural community life, R. A. Polson. (Cornell Univ.). (*Rural Sociol., 8 (1943), No. 2, pp. 123–129; Span. abs., p. 123*).—The impact of the war on rural community life in the Northeastern States seems most pronounced in those phases of living sensitive to restrictions on transportation. Juvenile delinquency has increased, particularly in those localities where young people no longer have access to commercial recreation. The rapid exodus of individuals in the productive ages of the population has created a shortage of labor and a curtailment of community services. The proportion of the population in the dependent ages has materially increased. Rural organization adjustments to a war economy and the necessity of promoting war programs have placed a heavy load on local leaders. Out of this situation has come an increased interest in neighborhood activity and organization devices for community coordination of war work.

Differential achievement among Iowa counties in civilian war programs, C. A. Anderson and B. Ryan. (Iowa Expt. Sta.). (*Rural Sociol., 8 (1943), No. 2, pp. 130–138; Span. abs., p. 130*).—Effective community performance on civilian war programs contributes significantly to success in total war. Interest has been limited to preoccupation with protective services such as air-raid defense plans. At the time of writing, civilian defense offices were not yet effectively organized in all Iowa counties, and they existed in few local communities.

Effects of war on the social and economic status of farm laborers, P. S. Taylor (Univ. Calif.). (*Rural Sociol., 8 (1943), No. 2, pp. 139–148; Span. abs.,* *p. 139*).—War, drawing off the glut of farm laborers, has produced higher wage rates and incomes. The more casual the employment, the greater have been the gains, since employment is fuller. This suggests what thorough labor decasualization might accomplish. Heavier importations of foreign labor are in prospect, mainly from Mexico. Protective laws for agricultural workers, who have been "frozen" by deferment from military service, seem unlikely. Newly perfected labor-displacing machines such as sugar beet and cotton harvesters are not coming into general use now when employment is available, but may be expected at war's end.

Cultural factors which result in artificial farm labor shortages, A. Raper and F. H. Forsyth. (U. S. D. A.). (*Rural Sociol., 8 (1943), No. 1, pp. 3–14; Span. abs., p. 3*).—The status of the farm worker is at the heart of the farm labor situation. He has commonly been a seasonal worker in commercial crop areas, or he has been an underemployed subsistence farmer in areas of low physical resources. In commercial crop areas where farm workers have had low status, many middle- and upper-income families have traditionally done little actual farm work. As a result of these cultural factors, rural manpower in many parts of the Nation has been chronically underused. With effective motivation, a few thousand underemployed rural dwellers have already been transferred to areas where there are severe shortages of farm labor. Members of farm families with "overseer" traditions are beginning to look upon farm work as a patriotic opportunity. Employed townspeople and urban high school and college students are helping the farmers in many parts of the country.

Wartime migration and the manpower reserve on farms in eastern Kentucky, O. F. Larson. (U. S. D. A. coop. Ky. Expt. Sta.). (*Rural Sociol., 8 (1943), No. 2, pp. 148–161, illus. 2; Span. abs., p. 148*).—Between April 1, 1940, and December 1, 1942, a decrease of 19 percent in the rural-farm population of 33 eastern Kentucky counties is estimated on the basis of a population census for 5 selected areas. This decrease exceeded the gain from 1930 to 1940, taking 40 percent of the men 15–34 yr. of age. Few of the emigrants had entered agriculture. Remaining workers estimated as available for more productive employment at the close of 1942 exceeded the number who had left since the 1940 U. S. Census. The low estimate of 63,000 available workers aged 15–59 included 28,000 married men. Wives without children under 10 yr. of age and youths of 15 and over normally in school part of the year were included in the high estimate of 98,000 available workers.

War and migration of rural youth: A study of Ross County, Ohio, A. R. Mangus and C. E. Sower (*Ohio State Univ. and Sta., Dept. Rural Econ. and Rural Sociol. Mimeog. Bul. 149 (1942), pp. 9+*).—The extent of migration and the age, destination, occupation, level of living, school-grade attainment, and marital status of the migrants are discussed.

Wartime migration of farm youth, A. R. Mangus (*Ohio Sta. Bimo. Bul. 222 (1943), pp. 105–107*).—This survey indicated that between 1940 and 1943 the farm youth of the State of Ohio declined from 285,000 to only 191,000, a loss of 33 percent.

Some limitations of "live-at-home" programs, V. B. Sullam. (N. C. State Col.). (*Rural Sociol., 8 (1943), No. 1, pp. 24–35; Span. abs., p. 25*).—"Live-at-home" programs must be appraised ex visu both of their effects upon the nutritional levels of subsistence farmers and of their relation to the war effort. From the standpoint of nutrition, diets obtained only from one or a few types of soil ("monoedaphic" and "oligoedaphic" diets) will reflect in their composition the excesses and deficiencies of minerals of the soil. Excess minerals, selenium and fluorine, may seriously impair the health of the population if a monoedaphic diet is established. Therefore in seleniferous and fluoriniferous areas, most of the foodstuffs should be obtained from other localities, where the composition of the soil is different. Deficient minerals, such as iodine and iron, call for adequate integration of locally produced diets. In relation to the war effort, the low efficiency of small enterprises and the wastage accruing from household processing of agricultural commodities should be considered before recommending "live-at-home" programs. Community and cooperative processing centers might constitute at least a partial solution.

Housing and attitudes toward housing in rural Pennsylvania, H. R. Cottam (*Pennsylvania Sta. Bul. 436 (1942) pp. 63+, illus. 19; Sup. Tables, pp. [41]*).—Personal interviews made in 517 rural homes in 10 selected areas in rural Pennsylvania were supplemented by 1,417 reports obtained by school children on a questionnaire.

Farm housing was rarely as bad and seldom as good as some of the country-nonfarm housing, but these two open-country classes averaged about the same. Homes owned by the occupants were better than those rented, but mortgaged homes were about as good as debt-free homes. The absence of children was most common where housing was good. Families reporting American nationality backgrounds had good housing in slightly larger proportions than did families of other nationalities. Housing of families classified as church members was better than housing of nonmembers. Attitudes were most favorable where there were good sanitation, provisions for safety, an abundance of labor saving devices, adequate electrical conveniences, and ample space. There were observed many rural families living in houses which were below reasonable standards of health, comfort, and efficiency. Most of these families were dissatisfied with their homes, but a few were quite contented. Curtailment of housing construction and repair together with the cessation of mass production of consumer housing items suggest that housing needs will, during the next few years, become increasingly great in rural areas.

The supplementary tables, issued separately, number 165.

Measurement of housing and attitudes toward housing in rural Pennsylvania, H. R. Cottam (*Pennsylvania Sta. Bul. 436 (1942), Methodol. Sup., pp. 30+*).—This is a methodological supplement to Bulletin 436, noted above.

Family health practices in Dallas County, Missouri, I. Meier and C. E. Lively (*Missouri Sta. Res. Bul. 369 (1943), pp. 32*).—In this survey a total of 258 open country families were interviewed. During the 12 mo. previous to the survey 72 percent of the families used one to five doctors in the treatment of illness or disability. Most babies were delivered by practitioners. Dental care, for most people, was limited to extractions. Only two-fifths of the families had ever had a member in the hospital. There was no general hospital in the county. Much of the illness was cared for at home. Home remedies and patent remedies were plentifully used. Four out of five families claimed they took some measures to prevent illness. Dietary measures were employed by 16 percent, patent remedies, drugs and home remedies by 21 percent, and immunization by 51 percent of the families. Only 9 percent carried health or accident insurance.

Lists are appended of the unprescribed drugs and remedies reported in use, the favorite home remedies used, and the ailments treated.

Ethnic group relations in a rural area of Connecticut, N. L. Whetten and A. W. Green (*[Connecticut] Storrs. Sta. Bul. 244 (1943), pp. 89, illus. 4*).—This study is concerned with ethnic group adjustments in a rural area in two towns of eastern Connecticut, and is based on 772 schedules representing about 80 percent of the total population.

In Connecticut the older Yankee stock has been leaving the land, and this land is gradually being taken over by immigrant families, mostly from southern and eastern Europe. According to the United States Census of 1940, 20.1 percent of the rural-farm population of Connecticut is foreign-born, or one out of every five persons; and it is estimated that considerably more than half of the rural-farm poulation of the State is of foreign stock (i. e., foreign-born and native-born of foreign or mixed parentage).

In the area studied, the Finns tend to be clustered in more or less contiguous sections of the rural farming areas of the district; the French-Canadians definitely cluster in the industrial village of East Brooklyn; and the Yankees predominated in the residential village of Brooklyn Center, though they are found scattered in the farming areas of both towns. As compared with the other groups, the Finns have an extremely low fertility ratio and the French-Canadians a very high one. French-Canadians are marrying largely within their own ethnic group, while the children of Finns are going from the district into surrounding urban areas and marrying among other ethnic groups. As a group, the Finns have gone into farming to a greater extent than have any of the other groups. The French-Canadians are, for the most part, mill workers, many of them working in industrial villages of adjoining towns The Yankees are also farmers to a large extent, although they are disproportionately represented in the white collar occupations, as well. From the standpoint of total farm production, it would seem that the Finns are rapidly taking over the district.

Housing and living standards, educational adjustments, political relations, and formal and informal social participation of the various groups are also compared

Land, people, and farming in a rurban zone, W. R. Gordon and G. S. Meldrum. (Coop. U. S. D. A.). (*Rhode Island Sta. Bul. 285 (1942), pp. 48, illus. 3*).—This is a comparative study of two towns—Exeter, one of the most rural towns of the State, and Westerly, a built-up center which has some traits of a small summer resort city with an adjacent countryside devoted to both residential use and some farming. The population—household composition, living conditions, mobility, and place of birth; the agriculture—types of farming, size of units, ownership, marketing, part-time farming, etc.; the incomes from family and nonfarm occupations; and the social participation of the two areas are discussed and compared.

Rural-urban variations in the age of parents at the birth of the first child, O. D. Duncan (*Rural Sociol., 8 (1943), No. 1, pp. 62–67; Span. abs., p. 62*).—Employing data taken from Oklahoma birth certificates, comparisons are made between open country, village, and urban populations. The rural populations begin effective fertility a year or more sooner than the urban. Age differences between parents and correlations between mothers' and fathers' ages are also found to vary according to residence.

Neighborhoods, townships and communities in Wright County, Minnesota, V. Davies. (Minn. Expt. Sta.). (*Rural Sociol., 8 (1943), No. 1, pp. 51–61; Span. abs., pp. 51–52*).—It is concluded that with the exception of Stockholm and a very few other clusters of families identifying themselves with small trade centers, locality-name-conscious farm-neighborhood groups do not appear to exist in Wright County, and there is little reason to believe that they ever existed to a significant extent. Townships have historical, political, and name importance, and, while they are losing some functions, they have gained others of social and economic importance, and are the local areas to which a sizeable majority of the farm families identify themselves. The rural communities of the county seem to have a considerable degree of integration and social cohesion, as evidenced by the readiness with which they could be delineated and the high correspondence between community identification and trading preference.

Social economics of North Dakota, J. M. Gillette (*Minneapolis, Minn.: Burgess Pub. Co., 1942, pp. 245+, illus. 58*).—Included are a historical sketch of

North Dakota, its physical conditions and resources, population, agricultural conditions, industry, urban, public health, education, church, highway, recreational, and other conditions and facilities.

The community and the family in Prince Edward Island, E. Charles and S. Anthony (*Rural Sociol., 8 (1943), No. 1, pp. 37–51, illus. 1; Span. abs., pp. 37–38*).—A previous statistical study has shown that in Prince Edward Island the size of the family has remained unusually stable for two generations. Field study of rural life on the Island revealed features which have helped to maintain relatively high fertility. Within the neighborhood, a unified school system and the absence of marked inequalities of wealth have encouraged tolerant and egalitarian attitudes. The organizational basis of the neighborhood gives social prestige and leadership to successful parents of large families, and it appears to function most successfully where there are many children in the group. Geographical and psychological isolation from the mainland has helped till recently to preserve Island ways of life from disintegrating contacts. The pattern of life described already shows signs of disintegration and is unlikely to endure.

The family and individual social participation, W. A. Anderson. (Cornell Univ.). (*Amer. Sociol. Rev., 8 (1943), No. 4, pp. 420–424*).—The hypothesis presented in this paper is that the social participation of an individual is to a considerable degree a function of the social participation of the family. If husbands participate, wives usually do, and if husbands and wives participate, children usually do, so that participation is chiefly a family trait.

A short form of the farm family socioeconomic status scale, W. H. Sewell. (Okla. Expt. Sta.). (*Rural Sociol., 8 (1943), No. 2, pp. 161–169; Span. abs., p. 161*).—Since the publication of the farm family socioeconomic status scale (E. S. R., 83, p. 696), there has been considerable demand for a still briefer instrument for measuring the socioeconomic status of farm families. The author has attempted to satisfy this need by constructing a scale including 14 of the most easily obtainable items from the original scale. Item analysis proved that these items possess sharp diagnostic capacity in samples taken from Oklahoma, Kansas, and Louisiana farm populations. The validity of the short scale for the three sample areas was established in terms of the very close agreement between the measurement produced by it and that of the original scale. The reliability tests, likewise, proved satisfactory. Tentative norms were constructed for the sample groups. After considering its advantages and limitations, it was decided that the short form of the scale produces satisfactory results and may be employed in studies where time and space limitations make the use of the longer original form seem inadvisable.

Differences between persons responding and not responding to a mailed questionnaire, C. F. Reuss. (Wash. Expt. Sta.). (*Amer. Sociol. Rev., 8 (1943), No. 4, pp. 433–438*).—The author found marked differences between respondents and nonrespondents to a mailed questionnaire. Higher intelligence scores and scholarship, loyalty or ties to the questionnaire sponsor, and a rural background seem to be positively associated with the tendency to respond. Knowledge of the probable tendencies of bias in response to mailed questionnaires should enable the investigator to evaluate his returns and to phrase his questions and his appeal for response in a more effective manner.

Development of a 1940 rural-farm level of living index for counties, M. J. Hagood. (U. S. D. A.). (*Rural Sociol., 8 (1943), No. 2, pp. 171–180; Span. abs., p. 171*).—From a preliminary list of 14 suggested components, 5 have been selected for a 1940 rural-farm level of living index: (1) Adequacy of housing space, (2) radios, (3) farm income, (4) late model automobiles, and (5) schooling completed.

AGRICULTURAL AND HOME ECONOMICS EDUCATION

A history of the Iowa State College of Agriculture and Mechanic Arts, E. D. Ross (*Ames: Iowa State Col. Press, 1942, pp. 451+, illus. 30*).—This history deals with the development of the institution under the section headings of Background and Beginnings, 1838–1869; Technological Pioneering, 1870–1890; Passing of the Educational Frontier, 1891-1911; and College and Commonwealth, 1912–1940.

The strength of 8,000 (*N. J. Agr., [Rutgers Univ.], 25 (1943), No. 2, pp. 5–6, 8, illus. 1*).—The work of the New Jersey Farm Bureau is briefly described.

Laboratory manual for students of agronomy, L. F. Graber and H. L. Ahlgren (*St. Louis, Mo.: John S. Swift Co., 1942, 3. ed., pp. 155+, illus. 94*).—Fifty exercises "are supplementary to a general survey of plant science for college students in which emphasis is placed on the applications of biological fundamentals to agronomic practice . . . [and] are partly of an observational character being supplemented profusely with questions which help to illustrate the applications of the botanical fields of morphology, physiology, and heredity to the problems of agronomic practice." Tables of weights and measures, with a number of farm problems, and definitions of common agronomic terms are included.

Supervised farming in vocational agriculture, G. P. Deyoe (*Danville, Ill.: Interstate, 1943, pp. 502, illus. 140*).—"This book is designed to provide a detailed treatment of principles and procedures for conducting these activities [of supervised farming], and it is intended for use in courses in special methods and student teaching in vocational agriculture as well as in separate courses on supervised farming and course building for graduates and undergraduates. In addition, it is designed for use as a professional guide for teachers of vocational agriculture, teacher trainers, supervisors, and others responsible for the development of vocational education in agriculture." The 13 chapters deal with the importance, a broadened concept, evaluation, and accomplishments of supervised farming; the selection, planning, developing, and supervision of programs; the keeping and using of records; the relation of supervised farming to establishment in farming; supervised farming for young farmers and adults; and education of teachers for conducting programs. Each chapter is followed by a list of suggested, special, and general references.

The diffusion of hybrid seed corn in two Iowa communities, B. Ryan and N. C. Gross . (Iowa Expt. Sta.). (*Rural Sociol., 8 (1943), No. 1, pp. 15–24, illus. 4; Span. abs., p. 15*).—As an example of how a cultural element or element complex may be acquired or improved upon, hybrid seed corn has diffused through the Midwest with phenomenal rapidity. In the space of 4 yr., 1936–39, two-thirds of the operators in the two communities studied changed to the new seed. Relatively few, however, took over hybrid seed for their entire acreage the first year they tried it. This was true even for operators first using the seed at a relatively late date. There appears to be some difference between the diffusion of agencies which informed farmers of the new seed and the sources of influence toward adoption. Commercial channels, especially salesmen, were most important as original sources of knowledge, while neighbors were most important as influences leading to acceptance.

FOODS—HUMAN NUTRITION

Annual review of biochemistry, XII, edited by J. M. Luck and H. J. C. Smith (*Stanford University, Calif.: Ann. Rev., Inc., 1943, vol. 12, pp. 704+, illus. 1*).—Among the 24 papers comprising this annual review (E. S. R., 86, p. 413), the following deal with topics of nutritional significance: Biological Oxidations and Reductions, by F. Lipmann (pp. 1–26); Proteolytic Enzymes, by R. M. Herriott (pp. 27–44); The Steroids, by H. Sobotka and E. Bloch (pp. 45–80); The Chemistry of the Proteins and Amino Acids, I, II, by L. F. Hewitt, R. A. Kekwick, and A. S. McFarlane (pp. 81–114); The Chemistry and Metabolism of the Compounds of Sulfur, by J. C. Andrews (pp. 115–134); Carbohydrate Metabolism, by H. J. Deuel, Jr. (pp. 135–156); Fat Metabolism, by G. O. Burr and R. H. Barnes (pp. 157–182) (Univ. Minn.); The Metabolism of Proteins and Amino Acids, by H. Borsook and J. W. Dubnoff (pp. 183–204); The Chemistry of the Carbohydrates, by H. S. Isbell (pp. 205–232); The Chemistry of the Lipins, by S. J. Thannhauser and G. Schmidt (pp. 233–250); Mineral Nutrition, by L. A. Maynard and J. K. Loosli (pp. 251–272) (Cornell Univ.); The Chemistry of the Hormones, by H. Fraenkel-Conrat (pp. 273–304) (Univ. Calif.); Water-Soluble Vitamins, by R. J. Williams (pp. 305–352); Fat-Soluble Vitamins, by K. Hickman (pp. 353–396); Nutrition, 1941 and 1942, by C. S. Lanford and H. C. Sherman (pp. 397–424); and Animal Pigments, by C. Rimington (pp. 425–446).

United Nations Conference on Food and Agriculture, Hot Springs, Virginia, May 18—June 3, 1943: Final act and section reports (*Washington: Govt., 1943, pp. 61+*).—This report comprises a summation of the work of the conference by the secretary general, W. Kelchner; the complete text of the final act of the conference, including lists of delegates, officers of technical sections and committees; declaration, resolutions, and recommendations; and appendixes consisting of the records of the three sections into which the conference was divided—section 1, consumption levels and requirements; section 2, expansion of production and adaptation to consumption needs; and section 3, facilitation and improvement of distribution. The work of section 1 was divided among three committees, the first two of which dealt with food and the third with other essential agricultural products. Committee 1 considered the character and extent of consumption deficiencies in each country, the causes and consequences of malnutrition, and reasonable national and international goals for improved food consumption. Committee 2 dealt with measures for improving standards of food consumption (education, etc.). The reports of these two committees are combined in part 1 of the section report, the scope of which is described as follows:

"The difficult problem of dietary standards and requirements has been considered, with particular reference to existing reality. No attempt has been made to put forward objectives beyond reasonable hope of attainment, although it is insisted that intermediate objectives should not obscure our view of the ultimate objective, which is a vastly different world fed in full accordance with the nutritional requirements of its population. Certain specific measures for overcoming malnutrition have been dealt with as among the necessary steps toward the attainment of the goal. These include education and methods of improving the diet of vulnerable groups. Finally, brief allusion is made to a number of other questions which are of importance in the campaign for better food. Within the short space available, it is obviously possible only to outline the broad approach to the problem."

The remainder of the report is noted on page 739.

Proceedings of the Sixth Pacific Science Congress of the Pacific Science Association (*Berkeley: Univ. Calif. Press, vol. 6, pp. 747+, illus. 114*).—Included among the papers presented at this Congress, held at the University of California, Berkeley, Stanford University, and San Francisco, July 24 to August 12, 1939, are the following dealing with the diets and nutrition of various racial groups: The Inadequacies of the White Bread, Sugar, and Meat Diet and Practical Means of Supplementing It, by F. F. Tisdall (pp. 229–232); The Calcium Inadequacy of the White Bread, Sugar, and Meat Diet and Practical Means of

Supplementing It, by H. H. Mitchell (pp. 233–242) [Univ. Ill.]; Vitamin B Deficiencies in American and Asiatic Diets, by T. D. Spies (pp. 243–245); Thiamin (Vitamin B_1) Deficiencies in the American and Asiatic Diets, by E. B. Vedder (pp. 247–252); Vitamin B_1 Deficiencies in American and Asiatic Diets, by R. R. Williams (pp. 253–258); On Diets Consisting Principally of Milled Rice and Dried Salted Fish, by A. G. van Veen (pp. 265–269); The Inadequacies of the Polished Rice and Fish Diet and Practical Means of Supplementing It, by T. Saiki (pp. 271–277); Practical Means of Supplementing the Polished-Rice and Fish Diet, by I. A. Manville (pp. 279–286); The Inadequacies of the Polished-Rice and Fish Diet and Recommendations for Its Improvement in the Philippines, by I. Concepcion (pp. 287–298); Vitamin B_1 Deficiency in the Chinese Diet, by H. C. Hou (pp. 299–311); The Improvement of the Poor Rice-Eaters' Diet, by W. R. Aykroyd (pp. 313–317); The Present Status of Nutrition Work in the Philippines, by F. O. Santos (pp. 319–327); Calcium in the Chinese Dietary, by W. H. Adolph (pp. 329–332); Vitaamin A Deficiency in China, With Special Reference to a Specific Cutaneous Manifestation, by C. K. Hu (pp. 333–335); Vitamin Requirements of Man—New Viewpoints and Their Bearing on the Problems of Nutrition in the Tropics, by C. R. Cowgill (pp. 377–382); Vitamin B_1 Deficiency Studies in China, by G. D. Lu (pp. 383–387); Vitamin Content of Indian Foods and Its Relation to the State of Nutrition of the Population, by B. Ahmad (pp. 413–426); The Soybean in the Diet of Man, by R. A. Guy (pp. 427–436); Significance of Soybean in the Dietary of the Filipinos, by I. Concepcion (pp. 437–447); The Potential Role of Soybeans in the Occidental Diet, by S. Woodruff, M. M. MacMasters, and H. Klaas (pp. 459–469) [Ill. Sta.]; Diet in Relation to Tooth Decay—A Ten Years' Study on Children in Hawaii, by N. P. Larsen, G. P. Pritchard, C. Wilbar, Jr., and A. L. Y. Ward (pp. 569–580); The Distribution of Dental Caries and Some Related Considerations, by B. G. Bibby (pp. 581–588); Nutrition As a Factor in the Geographical Distribution of Dental Caries, by N. Simmonds (pp. 589–593); The Dental Health of the People of New Zealand, by E. P. H. Nash (pp. 621–623); The Extent of Dental Caries and Paradentosis in the Antipodes, by J. R. Gill (pp. 625–629); and Evidences of Mineral Deficiencies in the Northwest, by D. C. Hall (pp. 701–704).

National wartime nutrition guide (*U. S. Dept. Agr., War Food Admin., 1943, NFC–4, pp.* [7], *illus. 1*).—This leaflet contains a chart, showing graphically as segments of a circle the "basic 7" food groups—green and yellow vegetables; oranges, tomatoes, grapefruit (or raw cabbage or salad greens); potatoes and other vegetables and fruits; milk and milk products; meat, poultry, fish, or eggs; bread, flour, and cereals; and butter and fortified oleomargarine. Common foods in the groups are listed, and a list is also included of other foods commonly used, but not included in the basic 7 because they furnish mostly calories and few minerals, vitamins, or good quality proteins.

Comparative digestibility of wholemeal and white breads and the effect of the degree of fineness of grinding on the former, T. F. MACRAE, J. C. D. HUTCHINSON, J. O. IRWIN, J. S. D. BACON, and E. I. MCDOUGALL (*Jour. Hyg.* [*London*], *42* (*1942*), *No. 4, pp. 423–435*).—Breads from each of three flours were consumed by six persons for 11–12 days in amounts of 530–630 gm. dry weight per day. In the 7-day experimental period (following a preliminary period of 3 days) the total energy, nitrogen, and fiber of the food consumed and of the feces excreted were determined. In determining the digestibility coefficient from these data it was assumed that the foods other than bread (margarine, marmalade jelly, milk, and mild ale) were wholly digestible. The average percentage absorption of energy, nitrogen, and fiber from the white bread made from a straight run white flour of 73 percent extraction was 96.1, 91.1, and 65.8, respectively; from the fine whole-meal (100 percent extraction) bread, it was 86.9, 85.3, and 14, respectively; and from the coarser ground whole meal (100 percent extraction) 87.1, 85.7, and 9.7, respectively. Loss of 9 percent more of the energy of the bread in the feces from whole-meal than from white bread was apparently due to the undigested cell envelopes and woody fiber in the bran. The fineness of grinding of the whole meal made no significant difference in the utilization of either energy or nitrogen.

In these tests the net amount of nitrogen available to the body from 1 lb. of white flour was the same as from 1 lb. of whole meal, although the latter contained 8 percent more nitrogen than the former. The energy derived from the same weight of white flour was about 10 percent greater, and the subjects were unable to eat more of the whole-wheat bread to compensate for this. It is pointed out that, apart from digestibility, other factors, such as vitamin content and quality of protein should be taken into account in deciding how much of the wheat berry should be reserved for human consumption. In the present experiments the biological value of the nitrogen of the whole wheat used was about 20 percent greater than that of the white flour extracted from it according to tests credited to Chick; thus 10 gm. of the nitrogen of the whole wheat were worth 12 gm. of nitrogen from the 73-percent extraction flour made from it.

Choline and pyridoxine as factors in prevention of epithelial hyperplasia in the forestomach of rats fed white flour, G. R. SHARPLESS and M. SABOL (*Jour. Nutr., 25 (1943), No. 2, pp. 113–117*).—In an extension of earlier studies (E. S. R., 84, p. 705) it was found that choline and pyridoxin are necessary to help maintain normal epithelium in the forestomach of rats fed diets in which cystine and white flour furnished the only source of protein, and that calcium pantothenate does not improve such diets. Preliminary results with taurocholic acid indicate that regurgitated bile in the stomach may be partly responsible for the lesions and that choline may help prevent regurgitation of bile by stimulating the smooth muscle of the intestinal tract.

Relative nutritive value of different forms of milk, S. K. KON (*Nature [London], 148 (1941), No. 3760, pp. 607–609*).—This summary and review presents data representative of proximate constituents, calcium, and vitamin contents of raw, pasteurized, sterilized (boiled), dried, evaporated, and condensed milks, particularly as obtained on English markets. Nutritive losses in processing the raw milk are discussed, with the conclusion that the alternative forms of milk that may be offered to the adult population are perfectly satisfactory from a nutritional point of view even though their use may entail some readjustment of established food habits.

Nutritional needs and how milk constituents can help reduce them, W. E. KRAUSS. (Ohio Expt. Sta.). (*Milk Plant Mo., 32 (1943), No. 7, pp. 22–23, 25*).—In this discussion of milk as a priority food, the quantities of the various nutrients included in the National Research Council's recommended daily allowances for adults are compared with the quantities of the various items furnished by 1 qt. of raw milk. On the basis of a single unit for each of the 11 separate food constituents in the recommended allowances, the quart of milk is calculated to furnish 4.15 of a total of 11 units. Of these units, 2, vitamins A and D, are in the fat fraction and all the others in the nonfat portion of the milk. Correspondingly, of the 4.15 units furnished by 1 qt. of milk, 3.59 are in the nonfat fraction and only 0.56 in the fat portion. These calculations are used to show, first, that milk contributes from small to appreciable amounts of all the essential food nutrients and because of this serves as the best food around which to build a complete diet and, second, that in evaluating milk as a food at least as much emphasis should be placed on the nonfat portion as on the fat portion.

A report on margarine, L. A. MAYNARD ET AL. (*Natl. Res. Council, Reprint and Cir. Ser., No. 118 (1943), pp. 20+, illus. 1*).—This report, prepared by the committee on fats of the Food and Nutrition Board of the National Research Council, is presented in four sections dealing, respectively, with the current fat situation, the relative nutritive value of different fats, composition of margarine, and margarine legislation. The conclusions of the committee are summarized as follows:

"Margarine fortified with vitamin A in accordance with food and drug regulations supplies an important amount of this nutrient as well as of much needed fat. A previous recommendation of the Food and Nutrition Board that all margarine be fortified is reaffirmed. Because of the high proportion of margarine now fortified, mandatory requirement of fortification for all margarine for table use seems unnecessary at present, though it may become desirable if the situation changes in such a manner as to reduce importantly the proportion now fortified.

"The present available scientific evidence indicates that when fortified margarine is used in place of butter as a source of fat in a mixed diet, no nutritional differences can be observed. Although important differences can be demonstrated between different fats in special experimental diets, these differences are unimportant when a customary mixed diet is used. The above statement can only be made in respect to fortified margarine and it should be emphasized that all margarine should be fortified.

"It is obvious that the present excise and license taxes imposed by both Federal and State governments on margarine interfere with the distribution and utilization of certain of our fat resources, but the implications of these taxes are so extensive and complex that no recommendation with respect to them can be made in this report."

Report on butter substitutes by the New York Academy of Medicine (*Amer. Jour. Pub. Health, 33 (1943), No. 4, pp. 468–469*).—This report, prepared by the Committee on Public Health Relations of the New York Academy of Medicine, discusses the present status of the production of oleomargarine, State and Federal legislation concerning its use, and regulations fixing and establishing a definition and standard of identity as promulgated by the Federal Security Administration, June 1941, and presents certain conclusions and recommendations relative to the manufacture, distribution, and consumption of oleomargarine.

Comparative nutritive value of butter fat and vegetable oils, E. B. Hart. (Univ. Wis.). (*Amer. Jour. Pub. Health, 33 (1943), No. 3, pp. 265–266*).—The work in the author's laboratory demonstrating the superiority of butterfat over certain vegetable oils in the nutrition of young animals is reviewed briefly, with special reference to "filled milk." It is emphasized that this product should not be allowed to get into the channels of infant and child nutrition. "It may be a healthful food but it shows some deficiencies, just as do many of our staple foods, but where a food becomes the sole nutrient of the young, such as whole milk does, then the commercial distribution of an inferior substitute should be prevented."

Further studies on the growth-promoting value of butter fat, R. K. Boutwell, R. P. Geyer, C. A. Elvehjem, and E. B. Hart. (Wis. Expt. Sta.). (*Jour. Dairy Sci., 26 (1943), No. 5, pp. 429–437, illus. 1*).—In this extension of earlier studies (E. S. R., 87, p. 137) a basal ration of fat-free mineralized skim milk powder was substituted for the liquid skim milk of the earlier studies. The growth responses of groups of rats fed butterfat and corn oil at levels of 25, 30, and 35 percent of the ration were determined, as were also the effects of the age of the animal when put on experiment—14, 21, and 30 days. In other tests a synthetic ration was used to determine the effect of type of carbohydrate—lactose, dextrose, sucrose, dextrin, and starch.

The skim milk powder proved to be a more satisfactory basal ration than the liquid skim milk previously used. On this ration increasingly greater differences in the superiority of the butterfat over the corn oil were evident as the fat was raised from 25 to 35 percent of the diet. Greater differences were also secured the younger the rat at the start of the experiment. However, when the lactose was replaced by other carbohydrates, the superiority of the butterfat over the other oils was no longer evident. "With all the other carbohydrates tested the difference in the growth-promoting properties of the two fats was smaller and in favor of corn oil. From these facts it is evident that the variable nutritive value of the fats fed on the skim milk basal rations, either liquid or dry, is inherently related to the lactose content of the skimmed milk." Possible explanations of such results are discussed, with no final conclusion beyond the comment that "it seems that nature has put lactose and milk fat together as an optimum combination for the young animal."

The comparative nutritive value of butter and some vegetable fats, H. J. Deuel, Jr., E. Movitt, and L. F. Hallman (*Science, 98 (1943), No. 2536, pp. 139–140*).—Attention is called to the above noted report of Boutwell et al., and the general findings are reported of similar studies in which the rate of growth of 21-day weanling rats was followed for 6 or 12 weeks on diets composed of 68 percent of mineralized skim milk powder and 32 percent of the fat under study with suitable vitamin A, D, and E supplements. The fats included corn, cottonseed, olive, peanut, and soybean oils, as well as butter and vegetable margarine fat.

In one series, in which 46 males and 89 females were used, no differences in growth rate could be observed between the butterfat and the margarine-fat groups. In another series, in which each of the above listed fats was used during a 12-week period with 15 males and 15 females, no differences in growth rate were observed with either sex at 3 or 6 weeks, or with the males at 12 weeks. The females on the butter weighed slightly but not significantly more at 12 weeks than those on the margarine. In a third series comprising the same numbers diacetyl was added to the vegetable fats in the proportion of 4 p. p. m. In this group there were not only no differences in growth rate but also in the bone growth on the various fats as determined by X-ray measurement of the tibias at 3 and 6 weeks. No significant differences were obtained at the end of 12 weeks in analyses of the carcasses for water, protein, lipides, ash, and calcium. Rats given a choice of a diet containing margarine fat or peanut oil, with or without diacetyl, selected the diacetyl-containing diets 18 times as against the unflavored twice. In a test on 12 weanling rats over a period of 12 weeks a diet containing peanut oil flavored with commercial butter flavor was preferred by 8 of the rats, with none showing preference for the unflavored.

It is suggested that the greater growth reported for weanling rats on a butter diet where ad libitum feeding is employed may result simply from greater food consumption of the butterfat because of its flavor.

Digestibility of some animal and vegetable fats, R. Hoagland and G. G. Snider. (U. S. D. A.). (*Jour. Nutr., 25 (1943), No. 3, pp. 295–302*).—Following the same rat feeding method as in earlier studies (E. S. R., 83, p. 269), the digestibility of several edible fats and oils fed at 5- and 15-percent levels was determined with the following results:

At the 5-percent level the digestive coefficients were coconut oil 98.9, soybean oil 98.5, corn oil 97.5, butterfat 88.3, mutton tallow 74.6, oleo stock 74, and cacao butter 63.3 percent. At the 15-percent level the coefficients were soybean oil 98.3, corn oil 98.3, coconut oil 96.5, butterfat 90.7, oleo stock 86.7, mutton tallow 84.8, and cacao butter 81.6 percent. No consistent relationship was found between the melting points of the fats and their digestive coefficients.

Non-caloric functions of dietary fats, G. O. Burr and R. H. Barnes. (Univ. Minn. et al.). (*Physiol. Rev., 23 (1943), No. 3, pp. 256–278*).—This review deals chiefly with the literature of the past 5 yr. under the headings digestibility, mobilization and utilization of fatty acids, the essential fatty acids (an extension of a recent review by the senior author (E. S. R., 88, p. 701)), the relationship between dietary fats and other nutrients (including vitamin A, vitamin D, vitamin E, and the vitamins of the B complex), rancid fat, and the value of dietary fat as measured by growth and reproductive performance. In the last-named section emphasis is given to the conflicting reports in the literature on the comparative nutritive values of different lipides, both natural and synthetic, and the comment is made that "until all workers use exactly the same materials and conduct the experiments under identical conditions, conflicting results will continue to appear. From the explanation of these differences will come a more complete knowledge of the role of fat in the diet."

Preparing rabbit meat for the table, W. C. Thompson (*N. J. Agr. [Rutgers Univ.], 25 (1943), No. 2, pp. 4–5*).—Directions are given for killing, dressing, cutting up, and packing (for frozen storage) the domestic grain-fed rabbit. The best grade for meat is said to be the fryer, which should be prime for slaughtering when from 2 to 3 mo. old and weighing from 3½ to 4 lb.

Rabbit as you like it, W. C. Thompson (*N. J. Agr. [Rutgers Univ.], 25 (1943), No. 3, p. 4, illus. 1*).—Recipes are given for the use of fryer rabbits, as noted above, for baking, frying, rabbit pie, rabbit stew, and rabbit salad.

[Symposium on soybeans as food] (*Jour. Home Econ., 35 (1943), No. 4, pp. 201–213*).—This symposium consists of the following papers by research workers of the Alabama, Tennessee, Illinois, and Wisconsin Experiment Stations dealing largely with the results of research by the stations represented; Soybeans for Human Food, by W. D. Salmon (pp. 201–202); Soybeans in the Diet, by J. K. Hale (pp. 203–206); Soybean Studies in Illinois, by J. I. Simpson (pp. 207–210); and Effect of Different Cooking Methods on Soybean Proteins, by H. T. Parsons (pp. 211–213).

Home preparation of tomato products, C. S. Pederson and Z. I. Kertesz (*New York State Sta. Cir. 178, rev. (1943), pp. 10*).—In this revision (E. S. R., 78, p. 156) this circular is combined with Circular 195 (E. S. R., 88, p. 129) on the use of calcium chloride in the home canning of whole tomatoes.

Home-made sauerkraut, C. S. Pederson (*New York State Sta. Cir. 123, rev. (1943), pp. 7, illus. 4*).—This revision of a circular noted earlier (E. S. R., 66, p. 115) tells how to make and can sauerkraut, and discusses what happens in the curing of sauerkraut and how and why the product spoils.

Pickles and relishes, M. Doermann (*New Jersey Stas. Cir. 464 (1943), pp. 8*).—General suggestions and specific directions for the preparation of various pickles and pickle relishes are given.

Pickles in wartime meals, J. E. Richardson and H. L. Mayfield (*Montana Sta. Cir. 175 (1943), pp. 12*).—The qualities of a good pickle are noted briefly, and general suggestions for pickle making are given, together with reliable recipes for well-flavored but simple pickles and relishes appropriate to wartime conditions.

Victory storage of vegetables, P. Work. (Cornell Univ.). (*What's New in Home Econ., 7 (1942), No. 2, pp. 22–23, 84, 86, illus. 1*).—The principles involved in the requirements of low temperature and high humidity for the common storage of fruits and vegetables are discussed, and practical consideration is given to the management of temperature, humidity, and ventilation and to kinds of storage places and what to store and what not to store.

Your pressure cooker, H. V. JOHNSON (*Farm Sci. Rptr.* [*Iowa State Col.*], *4* (*1943*), *No. 3, pp. 14–16, illus. 3*).—Included with simple directions for the use of the regular pressure cooker is a brief discussion of the pressure saucepan, with a timetable based on laboratory tests for the cooking of asparagus, snap beans, carrots, peas, spinach, and beets.

Canning meats, M. DOERMANN (*New Jersey Stas. Cir. 469* (*1943*), *pp. 4*).—Warning is given that canning in a pressure cooker is the safest method for meat and that only thoroughly chilled meat from freshly slaughtered animals should be used; fish should be canned immediately after catching, but other meat may be held for several days if kept very cold. General directions and processing times are given. If the meat is processed in a boiling water bath as an emergency method, the contents of the jar should be boiled for 10 min. in an uncovered open kettle before tasting and serving.

Changes occurring during the blanching of vegetables, W. B. ADAM, G. HORNER, and J. STANWORTH (*Jour. Soc. Chem. Indus., Trans. and Commun., 61* (*1942*), *No. 6, pp. 96–99*).—Fresh peas, snap beans, runner beans, broad beans, carrots, parsnips, potatoes, swedes, brussels sprouts, and soaked peas and beans were used in these blanching tests involving blanching at 100° C. for 1, 3, and 6 min. in water and 3 min. in steam. The methods of preparing and processing the vegetables were similar to those met with under practical conditions, the ratio of water to solids (3:1) during blanching being much the same as in a fully loaded automatic blancher. The determined retentions of sugars, minerals, protein, and vitamin C under these several blanching conditions are reported as percentages of these nutrients present in the raw prepared vegetables, allowing for any change in weight which occurred due to absorption or loss of liquid during blanching. Data on the composition of the raw unblanched vegetables are also reported. Changes in weight and in volume due to blanching and drained weight as compared with filled weight in samples actually canned are reported as percentages of original weights or volumes.

The results, discussed in some detail, indicated that blanching generally caused a reduction in weight and volume of the vegetables, but that weight increased appreciably during processing, the increase being much greater in blanched than unblanched vegetables. The losses of nutrients were heaviest during the first minute of blanching, but continued at a rate making it advisable to reduce the blanching times to a minimum of 2 min. wherever practicable. Steam blanching caused much smaller losses than water blanching.

Spice oils and their components for controlling microbial surface growth, H. B. BLUM and F. W. FABIAN. (Mich. Expt. Sta.). (*Fruit Prod. Jour. and Amer. Vinegar Indus., 22* (*1943*), *No. 11, pp. 326–329, 347*).—Thirty-two spice essential oils and 7 compounds derived from them were tested for their effectiveness in controlling the development of troublesome organisms causing scum formation on the surface of fermenting foods or beverages. *Saccharomyces ellipsoideus* and *S. cerevisiae*, representing organisms that grow beneath the surface, and *Mycoderma vini* and *Acetobacter aceti*, organisms that grow on the surface, were used as test organisms, these being allowed to grow for a specified time in sterile cider before being planted in the test solutions. The efficacy of the spice oils or their components on these four organisms was judged from the alcohol production in the case of the true yeast, from inhibition and germicidal action in cider for all the organisms, and from the inhibiting action on yeast by the agar cup method.

The spice oils were found not to have the same relative effectiveness for all tests and organisms. However, oil of mustard was consistently superior to the others, followed by cinnamon, cassia, and clove oils. The resistance of the organisms varied with the organism and the spice, but in general their resistance decreased in the following order: *A. aceti*, *S. ellipoideus*, *S. cerevisiae*, and *M. vini*. The decreasing order of the germicidal activity of the spice components in the dilutions studied (1:10 to 1:10,000) were allyl isothiocyanate and carvacrol (equal), cinnamic aldehyde and cinnamyl acetate (equal), eugenol, eugenol ether, and eucalyptol. There was no correlation between surface tension and preserving or germicidal efficiency in the spice oils suggesting that their germicidal value was chemical rather than physical in nature.

Home preservation of fruit and vegetable juices, J. H. Clark (*New Jersey Stas. Cir. 468 (1943), pp. 4*).—Methods are described for preserving certain fruit juices, after which, it is suggested, they may be diluted, blended, sweetened, or further processed, depending on the ultimate use.

The effect of processing upon the nutritive value of food, G. E. Vail (Kans. State Col.). (*Jour. Amer. Dietet. Assoc., 18 (1942), No. 9, pp. 569–574*).—This review of studies concerned with the effect of storage, preparation, cooking, freezing, and canning on the nutritional value of food concludes that (1) conditions of storage and preparation best suited to the retention of color, flavor, aroma, and texture of food tend also to preserve nutritive value; (2) quick cooking of vegetables and fruits with the minimum exposure to air results in the least destruction of nutritive value; (3) solution of soluble nutrients tends to be proportional to the amount of cooking water used; and (4) cooking by steaming or panning or by means of a pressure saucepan results in a high retention of nutrients. Seventy references are given.

Freezing vegetables and fruits, W. E. Pyke and A. M. Binkley (*Colorado Sta. Bul. 478 (1943), pp. 16, illus. 3*).—This bulletin, giving practical directions for home freezing of fruits and vegetables, considers varieties most suitable for freezing; stage of maturity, quality conditions, and methods of handling most satisfactory; preliminary preparation; blanching times; and specific instructions for individual products. Preparation of the brines and sirups, including substitute sugar-saving sirups, and packaging and choice of containers are other points considered.

[Farm freezing units] (*Indiana Sta. Rpt. 1942, p. 36*).—In this progress report it is noted that certain vegetables, fruits, and meats frozen in two individual farm freezing units with freezing temperatures of —10° and 0° F. and storage temperatures of —5° and +5° kept in better condition for the most part than other lots of the same commodities frozen in a commercial locker plant. The only apparent reason for the difference was the speed with which the products were gotten into the freezing units. Products frozen in a third farm freezing unit without a freezing compartment and with variable freezing and storage temperatures between 0° and 20° were definitely inferior to the others.

Food preservation by drying, W. C. Krueger (*New Jersey Stas. Cir. 463 (1943), pp. 16, illus. 6*).—This circular, representing a compilation of material from various sources, points out that common storage, canning, and freezing are preferred methods of preservation, and that drying should be undertaken only when lack of facilities or equipment prevent preservation by these other methods. What fruits and vegetables are suitable for drying, general instructions on their preparation, drying methods and equipment (descriptions and plans included), and tests for dryness are considered, and specific instructions are given for drying particular fruits and vegetables. General instructions are also given for packaging and storage and for rehydration and preparation of the dried products.

Drying and dehydration of foods, H. W. von Loesecke (*New York: Reinhold Pub. Corp., 1943, pp. 302, illus. 64*).—This book represents a compilation of the latest practical information on the drying and dehydration of foods. As pointed out, it is not intended as an operating manual but only as a general outline of procedure and practice in commercial use. The following phases of the subject are considered: Types of dehydrators; sun-drying and dehydration of fruits; dehydration of vegetables; dehydration of eggs, milk, and butter; dehydration of meat, fish, and beef blood; plant sanitation; costs of dehydration; nutritive value of dried and dehydrated foods; packaging and storage; methods of analysis; and reconstitution of dehydrated foods. A glossary of terms and a partial list of patents pertaining to dehydration of foods are given in the appendix.

Some observations on dehydration, W. V. CRUESS. (Univ. Calif.). (*Fruit Prod. Jour. and Amer. Vinegar Indus.*, *22* (*1943*), *Nos. 9, pp. 265–268, 285, illus. 2; 10, pp. 300–302, 308, illus. 2; 11, pp. 331–333, 341, illus. 3*).—This is a résumé of a lecture presented to the Dehydration School, Albany, Calif., September 1942.

Home drying of fruits and vegetables with the W. S. C. dehydrater, C. L. BEDFORD, J. B. DOBIE, and L. J. SMITH (*Washington Sta. Pop. Bul. 172* (*1943*), *pp. 20, illus. 6*).—Drying, which is a satisfactory method for preserving a limited variety of fruits and vegetables, is recommended only as a supplement to canning, freezing, and storage. Consideration is given to methods of drying; selection of material; the preparation and drying of fruits, including the method of sulfuring, and specific directions for drying particular fruits; the preparation and drying of vegetables, including directions for blanching, and specific directions for particular vegetables; and storage and use of dried vegetables.

Plans and directions for the construction of the W. S. C. iron wire home dehydrator are given. In the interest of wartime conservation of materials, this dehydrator does not include a fan for forced draft or thermostatic heat control. In place of these the iron wire dehydrator makes use of the radiant heat principle in insuring a more equal distribution of heat.

Home dehydration of vegetables, S. G. DAVIS, W. B. ESSELEN, JR., and F. P. GRIFFITHS (*Massachusetts Sta. Bul. 404* (*1943*), *pp. 24, illus. 6*).—This bulletin, presenting possibilities of home dehydration as a practical method of food preservation, gives plans and construction details for home-built natural-draft and forced-draft dehydrators in one-family and several-family sizes; general directions for dehydrating vegetables; particular directions for dehydrating individual products; recommendations for packaging; and directions for rehydration. A comparison of costs of dehydration and canning indicates that the former method is relatively economical; it is pointed out, however, that common storage of the root vegetables is still more economical and that various problems, including time required and home storage methods for retaining satisfactory quality, make it unlikely that dehydration will replace canning and freezing in the home preservation of food.

A problem in dehydration of new potatoes, H. F. FRIAR. (Univ. Calif.). (*Fruit Prod. Jour. and Amer. Vinegar Indus.*, *22* (*1943*), *No. 11, p. 339*).—Trials in which potatoes were dehydrated by various procedures indicated that high humidity in the dehydrator was the large contributing factor to the off-color obtained in certain trial and commercial runs. A 5-percent citric acid dip, 2-percent salt dip, or 0.5-percent potassium metabisulfite dip following a 3-min. blanch resulted in products of satisfactory light color. Blanched potatoes dried at low humidity accompanied by low tray load and julienne style of preparation (rather than the cube style), together with two-stage dehydration, all of which tended to lessen the drying time, resulted in a dehydrated product of satisfactory color.

Prune dehydration experiments, W. V. CRUESS. (Univ. Calif.). (*Fruit Prod. Jour. and Amer. Vinegar Indus.*, *22* (*1943*), *No. 11, pp. 324–325, 330, illus. 2*).—Experiments to determine the effect of dipping on the drying rate of prunes showed that untreated prunes of the French variety dried considerably more slowly than those that were dipped or steamed, and that the steamed and lye-dipped prunes dried at about equal rates and more rapidly than did the hot water-dipped and untreated prunes. The difference in favor of the lye-dipped and steamed prunes was somewhat greater for prunes from the interior valley (California) than from the coast, probably because the former had thicker, tougher skins than prunes from the coast counties, and the cracking of these skins with lye or steam had a greater effect. Dipping of Imperial prunes from a coast county did not noticeably hasten the rate of dehydration, but steaming markedly shortened the drying time. Sulfuring of the prunes (Imperial) for 30 min. effectively prevented molding of the fruit that was sun-dried during periods of cool damp weather.

Salting and brining of vegetables, M. C. DOERMANN (*New Jersey Stas. Cir. 467 (1943), pp. 8*).—Methods are described for preserving vegetables by dry salting, by weak brine (5-percent salt solution plus vinegar), and by strong brine (15-percent salt solution). Directions for making sauerkraut in glass jars are also given.

Food poisoning, G. M. DACK (*Chicago: Univ. Chicago Press, 1943, pp. 138+*).—This book presents a critical discussion of the various agents that may cause food poisoning, including chemical poisons, poisonous plants and animals, and bacteria or their products. Botulism and staphylococcus food poisoning, both due to toxins of bacterial origin formed in the food before ingestion, and poisoning due to organisms of the *Salmonella* group and to alpha-type streptococci are considered in some detail. Such factors as types of food involved, epidemiology, symptomatology, laboratory diagnosis, mortality, pathology, and control are discussed. Brief chapters are devoted also to the significance of other bacteria in food poisoning and to infections to be differentiated from food poisoning.

Nutrition and physical fitness, L. G. BOGERT (*Philadelphia and London: W. B. Saunders Co., 1943, 4. ed., rev., pp. 500+, illus. 75*).—In this revision (E. S. R., 82, p. 699) the minerals and vitamins are discussed in greater detail than in the earlier editions, new material has been added on nutritional problems growing out of scarcity and rationing, the tables have been revised, and some of the more general material has been curtailed.

Certain factors involved in the struggle against malnutrition and disease, M PIJOAN (*Inter-Americana [Univ. N. Mex], Short Papers No. 7 (1943), pp. 13+*).—In this paper, presented at the Conference on Latin America in Social and Economic Transition, held at Albuquerque, N. Mex., April 14, 1943, the author, as director of the U. S. Indian Service Nutrition Laboratory, has drawn upon his experience to discuss the nutritional factors responsible for poor health among the rural people of Central America and the southwestern United States, summarizing the situation as follows:

"Thus, on the basis of a poor nutritional intake depending basically on a high carbohydrate diet, a threshold nitrogen balance low in essential amino acids, the presence of anemias, and a series of avitaminoses, body economy is impaired and a series of chronic infections manifest themselves. The process of living is a debilitating one in many instances, and life may become an occupational disease. The question is: Does this process influence the function of an individual in society?"

In answer to the question raised, evidence is reported showing marked improvement in the educational progress in one of the Indian reservation schools following an increase in the protein, iron, and vitamin content of the diet to almost double the daily requirements. It is emphasized that any recommendations for dietary improvement should bear a close relationship to the culture of the people involved, and corrective treatment should involve materials which can be developed by the people themselves, such as extracts prepared from pine needles or chili for the treatment of scurvy, fish preparations for rickets, and yeast preparations for B complex deficiency rather than synthetic products.

[Feeding liberated countries and the nutrition program] (*Jour. Amer. Dietet. Assoc., 19 (1943), No. 4, pp. 259–273*).—The papers noted below were presented at a conference held in Washington, D. C., January 12, 1943, under the auspices of the Committee on Food Habits of the National Research Council: The Contemporary Food Situation Inside Holland, by L. 'A. H Peters (pp. 259–260); The Current Food Situation Inside Poland, by M. Babicka (pp. 261–264); The Relevance of Food at the Time of Occupation; Conditions in North Africa, by M. S. Eisenhower (pp. 265–266); The Preparation of an Emergency Ration for Use in Liberated Countries, by C. Chatfield (pp. 267–268), and Preparations for Longer Time Feeding in Liberated Countries, by E. F. Phipard (pp. 269–270) (both U. S. D. A.); and Yugoslavian Plans for Restored Food Sufficiency, by G. Radin (pp. 271–273).

An evaluation of the nutritional status of a population group in Madrid, Spain, during the summer of 1941, W. D. ROBINSON, J. H. JANNEY, and F. GRANDE (COVIAN) (*Jour. Nutr., 24 (1942), No. 6, pp. 557–584*).—The study reported was conducted on 561 persons in 106 families of low economic levels in an industrial suburb of Madrid by family food consumption records obtained by the inventory and purchase method, as described by Bigwood (E. S. R., 82, p. 416), individual clinical examinations, and laboratory determinations. For calculating the food values of the diets, tables were compiled from various sources in an attempt to approximate the content of Spanish foods. The clinical examination consisted of the usual diagnostic history and physical examination, with special attention to symptoms and signs of deficiency disease, and included examination of the cornea with slit lamp and biomicroscope, roentgenograms of the hand and lower leg of all children under 10 yr. of age, and certain anthropometric measurements. About 20 cc. of the venous blood was drawn from each subject for hemoglobin, erythrocyte count, hematocrit, serum protein, albumin, ascorbic acid, carotene, and vitamin A. For children under 6 yr. of age the phosphatase activity and inorganic phosphorus content of the sera were also determined.

The clinical and laboratory findings were considered to agree fairly well with predictions from dietary records, although these were admittedly far from accurate. The dietary records indicated average intakes of calories and calcium far below maintenance levels, a protein intake of questionable adequacy, levels of iron, phosphorus, thiamin, and ascorbic acid presumably adequate for maintenance, with border-line or under values for riboflavin and vitamin A. Clinically almost all of the subjects gave evidence of caloric underfeeding. Aside from two cases of nutritional edema, one of chronic pellagra, and three of rickets, there were no clear-cut cases of deficiency disease. A number of the subjects had skin lesions which might be attributed to vitamin A deficiency, and there was a fairly high incidence of capillary invasion of the cornea probably due to ariboflavinosis. In many of the subjects there were "signs and symptoms of a mild neural or neuromuscular disturbance of undetermined origin." The laboratory studies indicated that about one-third of the subjects had a mild macrocytic hyperchromic anemia and about the same proportion low serum vitamin A levels. Hypoproteinemia was indicated in about 11 percent of the males and about 5 percent of the females. Serum ascorbic acid values were at levels indicating adequate body stores, as judged by the League of Nations standards.

A nutrition survey of a small North Carolina community, D. F. Milam (*Amer. Jour. Pub. Health, 32 (1942), No. 4, pp. 406–412*).—A brief report is given of the survey, one phase of which has been noted (E. S. R., 87, p. 152). The methods followed (which included a thorough physical examination, a careful clinical history, a quantitative 7-day food intake survey, and various blood tests) are outlined, and the data are summarized in tables covering plasma ascorbic acid and vitamin A levels and average daily intakes of the various essentials by seasons and by groups. In addition to low ascorbic acid, subnormal intakes were also noted for vitamins A and B_1, riboflavin, calcium, and iron, and the blood values were slightly low for vitamin A and hemoglobin.

Nutrition in industry (*Milbank Mem. Fund Ann. Conf., Proc., 20 (1942), pp. 9–43*).—This is a summary of a conference held under the auspices of the Milbank Memorial Fund. Digests are given of special reports by W. A. Sawyer and R. Goodhart on present feeding facilities in industry, based upon surveys and personal observations, and by H. D. Kruse on a conception of deficiency states, a progress report by H. Borsook on a dietary survey and nutritional examination in an aircraft industry in California, with an analysis of the dietary survey by D. G. Wiehl, and a paper by J. H. Foulger on The Role of Nutrition in Combating Toxicities in Industry. The general discussion by the members of the conference following the presentation of the papers is also reported.

Manual of industrial nutrition (*U. S. Dept. Agr., Food Distrib. Admin., 1943, [NFC–1], pp. 25+*).—This manual, which has a foreword by W. H. Sebrell, outlines the national nutrition program for industry, basic considerations for an "in-plant" nutrition program, and some special considerations in industrial nutrition; presents a few suggestions on types of meals that are nutritionally satisfactory and practical for mass feeding, including menus for cold and hot lunches; gives suggestions as to the best methods of serving essential nutrients in preparing food for mass feeding; and summarizes a few recent dietary surveys and other studies indicating the extent of malnutrition existing among all classes of the population and in all sections of the country prior to the war, and the need not only for an extensive educational program but for greater attention to the feeding of industrial workers.

Planning meals for industrial workers (*U. S. Dept. Agr., Food Distrib. Admin., 1943, NFC–2, pp. 28+*).—The special food needs of industrial workers under varied conditions are noted, and four types of industrial food services (centralized, decentralized, combination, and box lunch services) are described, with the agencies commonly responsible for the service. Suggestions are given for the general planning of meals to meet the National Research Council's recommended daily allowances for moderately active men and women. Pattern menus, each meeting one-third of the day's allowances, are given, and the fundamentals of menu planning are discussed. The remainder of the publication is devoted chiefly to a series of menus for different types of food service in industry, including cafeteria, lunch combinations for canteen service, cold lunches, between meal snacks, and dinner specials. Suggestions are also given for main course combinations based on fish, poultry, beef, pork, lamb, variety meats, meat alternates, eggs, and substantial soups and for meat extenders, fillings for sandwiches, and desserts. Sources of additional information, both government and commercial, are listed.

Handbook for workers in school-lunch programs, with special reference to volunteer service, E. M. Cushman, H. LeBaron, M. Nesbit, and P. Sprague (*U. S. Dept. Agr., Food Distrib. Admin., 1943, NFC–3, pp. 30+*).—This handbook was prepared under the sponsorship of the cooperating committee on school lunches of the Nutrition Division of the Office of Defense Health and Welfare Services, composed of representatives of numerous government agencies and the National Congress of Parents and Teachers, by a selected committee of four women with wide and varied experience in the operation of all types of school-lunch programs. Because of the special reference of the publication to volunteer service, emphasis is given throughout to simple explanations of the place of the volunteer in the school-lunch program, the responsibilities of the volunteer and representatives of various school agencies for guiding and managing the program, the principles of an adequate school lunch, and the various jobs involved from meal planning to the keeping of records. Lists are given of the small equipment required for serving from 50 to 100 children and the quantities of common foods required for 50 servings.

How schools improve the nutrition of pupils, A. F. MORGAN. (Calif. Expt Sta.). (*Jour. Home Econ., 34 (1942), No. 10, pp 721–726*).—This discussion of an ideal school program for nutrition improvement is organized under five headings—(1) the actual feeding of the children in school, (2) the clinical examination of the children and subsequent treatment when found necessary, (3) direct and indirect education in nutrition of the children themselves, (4) education of the parents and teachers, and (5) education of the entire community. Examples are drawn from the literature of studies under the first two or action phases of the program.

How best to eat under war conditions, F. J. STARE (*New England Jour. Med., 228 (1943), No. 25, pp. 809–814*).—This is a practical discussion of nutritive requirements and means of meeting them under rationing and other wartime food limitations. Protein is discussed in some detail, with a table illustrating the additions that may be made from unrationed protein-rich foods to a calculated 24-gm. daily allowance of meat under the point system to obtain the desired 70 gm. of protein daily.

The effect of the selection of data on the mean basal metabolism and the variability of the basal metabolism of a large series of college women, C. M. YOUNG, M. S. PITTMAN, E. G. DONELSON, and G. M. KINSMAN. (Iowa, Kans., and Okla. Expt. Stas.). (*Amer. Jour. Physiol., 139 (1943), No. 2, pp. 280–287*).—In this, the eleventh paper of the regional project of the North Central States relating to the nutritional status of college women, the scope of which has been described by Nelson (E. S. R., 88, p. 545), an analysis is reported of basal metabolism data routinely obtained on the subjects in the four participating laboratories with respect to the effect which the selection of data exerts on the mean basal metabolism figures. The data were segregated by four methods of selection—(1) all data were averaged, (2) all observations on individuals for whom both the tests within a day and from day to day checked within 5 percent were averaged, (3) the lowest values on each of 2 days which checked within 5 percent were averaged, and (4) only the first observation was considered.

The mean obtained by using all of the data for an individual was very close to that obtained by using only the data which checked within 5 percent. In all cases except one (Oklahoma) the highest mean was obtained when the first observation only was used (method 4) and the lowest from the average of the lowest observation only (method 3). Quantitatively the differences were not great, and there was little difference in the mean metabolism whether all of the data were used or only those checking within 5 percent. Insistence on the 5-percent check materially reduced the available information, since in the various series only from 47 to 73 percent of the data could be used. A more serious criticism from the standpoint of statistical treatment of the data was the introduction of bias into the variance in all cases of selection. Treatment of all of the data (separately by State) by analysis of variance indicated that the variation within observations on the same day was insignificant, but between days of observation on the same individual was highly significant in two laboratories and significant in the other two.

"One observation made by an experienced technician should be sufficient to distinguish the pathological individual. For careful physiological work repeated observations on different days are a necessity. Since little advantage is gained in taking more than one observation per day on an individual, the best proposal for the use of experimental time would be to make a single observation each morning on as many individuals as time permitted. These individuals should be checked on later days."

The relationship between the curd tension of milk and gastric emptying time in children, G. HADARY, H. H. SOMMER, and J. E. GONCE, JR. (Wis. Expt. Sta.). (*Jour. Dairy Sci., 26 (1943), No. 3, pp. 259–269, illus. 1*).—The milks used were of different curd tension and included an unmodified whole milk (pesteurized), the same milk (1) homogenized and (2) converted to chocolate milk, and two soft-curd milks, the one a base exchange milk and the other an evaporated milk. These were bariumized for feeding as fasting test meals to children between the ages of 4 and 13 yr. who served as subjects in roentgenologic observations of gastric and colonic emptying times. From the roentgenographic records, which were made at 2–, 4–, 5–, and 6–hr. intervals after feeding, estimates of stomach or colonic emptiness were tabulated and analyzed statistically for the seven subjects who received the five milks. Analyses of the data indicated that no correlation existed between the curd tension of the bariumized milks and the stomach or colonic emptying times of these children. Soft-curd milks did not leave the digestive tract more rapidly than the hard-curd milk. Chocolate milk behaved in this respect as did all other soft-curd milks.

Calcium deficiency and gastric lesions in the rat, T. F. ZUCKER and B. N. BERG (*Soc. Expt. Biol. and Med. Proc., 53 (1943), No. 1, pp. 34–36*).—A report is given of the production of antral gastric lesions in rats by withdrawal of calcium from diets not supplemented with vitamin D but adequate for excellent growth and supplied with vitamin A and the B vitamins, the one diet in particular being well-supplied with protein and sufficiently well-fortified with B vitamins to insure against border-line values. In the latter series in which the animals on the adequate control diet were pair-fed with those on the calcium-free diet, the calcium-deficient rats developed antral lesions exclusively, while the control rats had a perfectly normal gastric mucosa. These results, particularly in comparison with those with the less satisfactory diet on which the calcium-deficient animals (not pair-fed with the controls) developed a few fundic and rumen lesions along with the numerous antral lesions, suggested that calcium deficiency per se was responsible for the fundic lesions, while deficiencies induced by lowered intake of other factors was probably associated with lesions in all stomach areas.

Appearance of ossification centers: Groupings obtained from factor analysis, M. ROBINOW (*Amer. Jour. Diseases Children, 64 (1942), No. 2, pp. 229–236, illus. 4*).—Roentgenograms of the upper and lower extremities at birth, at the ages of 1, 3, 6, 9, and 12 mo., and every 6 mo. thereafter were taken on 31 normal, healthy white children. Mean times of appearance of ossification centers were observed. Of the approximately 60 centers appearing between birth and 8 yr., 19 were selected for intercorrelation of the ages at which these centers appeared, and the correlations were subjected to factor analysis. This analysis indicated that there were at least two groups of variables and that in each group the variables (the times of appearance of the centers) were closely related to each other, but hardly related at all to the variables of the other group. These two groups involved times of appearance of the centers of (1) the round bones (carpals and tarsals) and (2) the epiphyses and the patella. The common qualities of the variables in these two groups are associated with what is designated as the "round bone factor" and the "epiphyses factor," respectively. Thus, all centers that were governed by the round bone factor, for example, tended to be relatively retarded (or advanced) if one center of the group was retarded (or advanced), although the various centers in the group did not appear at the same approximate age. Analysis of the data also yielded a third factor, but this had no obvious meaning and was possibly an artefact. This factor concept is considered to explain certain cases in which skeletal development is atypical. Methods are suggested by which meaningful "skeletal ages" may be assigned in such cases. Various possible applications of the observations are outlined.

Absorption of haemoglobin iron, D. A. K. Black and J. F. Powell (*Biochem. Jour., 36 (1942), No. 1–2, pp. 110–112*).—"A liter of blood was given by mouth to one normal and two anemic patients, and the fecal iron determined. It was found that 10–25 percent of the ingested iron was absorbed."

Vanadium—a consideration of its possible biological rôle, E. P. Daniel and E. M. Hewston. (U. S. D. A. et al.). (*Amer. Jour. Physiol., 136 (1942), No. 5, pp. 772–775*).—Eggs, milk, and tissues of normal adult stock rats and various materials commonly employed in stock diets for laboratory animals were analyzed by a spectrographic method applied to the materials after wet ashing. The spectrograph was tested to determine its sensitivity to vanadium, and three types of electrodes, including one of specially purified vanadium-free graphite, were employed. Under the conditions of the analysis and with the precautions employed, it was possible to detect spectrographically as little as 1–5 p. p. m. vanadium in the ash of biological materials. All samples analyzed failed to show any vanadium except the $CaCO_3$, which indicated a very slight trace of this element. These results, it is pointed out, do not confirm previous reports that vanadium is rather widely distributed. The data obtained on the vanadium content of normal rat tissues and egg yolk are interpreted to indicate that vanadium, if it functions in the normal nutrition of the rat or the developing chick embryo, must do so in concentrations of less than 1–5 p. p. m. of the inorganic content.

Compilation of recent data on mineral and vitamin values of foods, R. C. Clouse (*Jour. Amer. Dietet. Assoc., 18 (1942), No. 9, pp. 553–561*).—Data on mineral (Ca, P, and Fe) and vitamin constituents of various classes of food are compiled from credited sources in the scientific literature of the period June 1941 to April 1942. The collected figures, representing the first of such material to be compiled by the diet therapy section of the American Dietetic Association, are intended only as a supplement to the standard tables included in textbooks and other publications and are presented with the purpose of covering the lag between the appearance of the original data and their inclusion in other standard publications.

Synthesis of vitamins by intestinal bacteria, P. R. Burkholder and I. McVeigh (*Natl. Acad. Sci. Proc., 28 (1942), No. 7, pp. 285–289, illus. 1*).—Data are presented on the content of biotin, riboflavin, thiamin, and nicotinic acid, as determined by microbiological procedures, in bacterial cultures of six common intestinal bacteria grown for 48 hr. at 36° C. on a chemically defined medium. The organisms used in the tests included *Escherichia coli, Proteus vulgaris, Bacterium aerogenes, Alcaligenes fecalis, Bacillus mesentericus,* and *B. vulgatus.* The values, in comparison with those obtained for the inoculated medium kept at —2° to inhibit bacterial growth, indicate that under the conditions of the experiment these species of bacteria synthesize B vitamins in greater amounts than are used in their metabolism, and the residues accumulate in the cultures. A few tests made on filtrates and whole cultures of *E. coli* and *Bacterium aerogenes* indicate that from 1 to 15 percent of the total biotin and nicotinic acid present in 48-hr. cultures occurs outside the cells, while somewhat larger proportions of the riboflavin and thiamin are leached from the bacteria. In cultures of *B. aerogenes* grown for 111 hr. about 30 percent of the biotin, thiamin, and riboflavin and 40 percent of the nicotinic acid produced by the bacteria are found in the filtrate. A study with *B. aerogenes* indicates that comparatively large proportions of the vitamins are synthesized during the early stages of growth of the culture.

The industrial development of synthetic vitamins, R. T. Major (*Chem. and Indus., 62 (1943), No. 3, pp. 19–23, illus. 10*).—An address.

The role of vitamin concentrates in war and in post-war food relief in Europe, V. P. Sydenstricker. (Univ. Ga.). (*Nutr. Abs. and Rev., 12 (1943), No. 3, pp. 339–344*).—The topic is discussed under the general headings effect of enhancing the normal vitamin supply, vitamin supplies of industrial workers, vitamin supplies in pregnancy and childhood, post-war situation, and food situation in occupied Europe. In the author's opinion "in the present state of knowledge there is no good reason for supplementing the diets of service personnel, of workers, or of the general population with vitamins. Should available supplies of protective foods fail, then general use should be made of such vitamins and concentrates as are required to maintain good nutrition. Young children and pregnant women very frequently require certain vitamin suplements during normal times. During war the use of such supplements probably should be extended to a great majority of the children and expectant and nursing mothers. In Europe after the war, the most urgent need will be for calories and protein. An abundant reserve of foods of the best nutritive value and of good keeping qualities must be provided. All types of severe deficiency disease undoubtedly will occur and provision must be made for vitamins and concentrates in sufficient quantities to deal with epidemics of vitamin deficiency. It is particularly important to have large supplies of yeast and of liver extract suitable for injection in addition to preparations of synthetic vitamins."

[Vitamins A and C in Florida fruits and vegetables] (*Florida Sta. Rpt. 1942, pp. 76–77*).—Data are reported on the vitamin A and C content of the following foods: Cabbage (vitamin A only), papaya, guava, Ceylon gooseberry, jujube, canistel, white-sapote, and tomatoes.

Spectroscopic studies on vitamin A and carotenoids in eggs (*Indiana Sta. Rpt. 1942, p. 40*).—No appreciable destruction of vitamin A or carotenoids, as determined by spectroscopic analysis, was noted in fresh homogenized eggs during dehydration and subsequent storage of the samples at —20° C. for 1 mo.

The vitamin A contents of the livers of sheep, cattle, and pigs, T. Moore and J. E. Payne (*Biochem. Jour., 36 (1942), No. 1–2, pp. 34–36*).—Various samples of beef, sheep, calf, and pig liver obtained from English retail markets were analyzed for vitamin A by the $SbCl_3$ method after extraction of the liver fat by digestion with alkali. Blue units were converted into International Units by use of the factor 0.6. Carotene was found to be virtually absent in sheep and pig livers, but small amounts, 0–88 I. U. per gram, occurred in selected samples of bovine liver. Vitamin A in I. U. per gram averaged 459, 144, 39, and 45, respectively, for samples of sheep, beef, calf, and pig liver obtained in summer and winter. "The livers of cattle and pigs were usually richer in vitamin A in summer than in winter, but no difference was found with sheep."

Vitamin A metabolism and requirements as determined by the rhodometer, E. L. Batchelder and J. C. Ebbs (*Rhode Island Sta. Bul. 286 (1942), pp. 24,* *illus. 9*).—Following a brief discussion of the general significance of dark adaptation and a review of the literature on its measurements and relation to vitamin A, a new portable dark-adaptation instrument termed the rhodometer is described, with details for its construction and directions for its use. Data are then presented, with illustrative charts, on the dark adaptation of over 200 college students on freely chosen diets and on single subjects during repletion and depletion tests.

Significant features claimed for the rhodometer are its easy construction and operation, its portability and adaptability for field tests, and its accuracy as indicated by the ability of two operators making successive tests to obtain almost identical results. Contributing to the sensitivity and accuracy of the test is the use of an artificial pupil.

For the simple detection of poor dark adaptation, a 12- to 15-min. test is considered satisfactory, with 30 min. more desirable for research purposes. The 30-min. tests on the college students showed a wide range in the visual thresholds of these presumably healthy subjects on freely chosen diets. When 12 of the subjects showing poor adaptation were given massive doses of vitamin A, only 2 showed improvement. The possibility is suggested that some normal individuals may have poor dark adaptation, but whether or not this indicates unsatisfactory vitamin A status, it is thought to be of value in classifying people according to their fitness for occupation requiring good night vision. In repeated tests on individuals on a freely chosen diet daily changes in the visual threshold did not correlate satisfactorily with the vitamin A intake as calculated from records of food consumption, but in later tests on subjects receiving control diets of known vitamin A content the correlation was good.

Three subjects kept for several months on a vitamin A-free diet showed a gradual rise of visual threshold at all intervals in the 30-min. test and a decrease in the difference in the visual threshold at 15 and at 30 min. The threshold at 30 min. rose at least 1 log unit within the 3-mo. period. After this depletion the 3 subjects were given daily vitamin A doses of 99,000 International Units for 3, 5, and 6 days, respectively. Improvement in the 30-mm. threshold was noted within the first 24 hr. and increased daily. The subjects receiving the supplements for 3 and 5 days were then given 5,500 I. U. daily for 11 and 12 days, respectively, with a slight improvement in the threshold. The other subject was given no vitamin A for 4 days, at the end of which her light threshold had risen appreciably. These findings are thought to suggest that the vitamin A stores of these subjects were inadequate to meet a dietary vitamin A deficiency for more than a few weeks, that no substantial store of vitamin A was built up by feeding almost 600,000 I. U. in 4 days, and that 5,500 I. U. daily was more than the minimum amount needed for maintenance.

The effects of a diet deficient in part of the vitamin B complex upon men doing manual labor, R. E. Johnson, R. C. Darling, W. H. Forbes, L. Brouha, E. Egaña, and A. Graybiel (*Jour. Nutr., 24 (1942), No. 6, pp. 585–596, illus. 1*).—Ten men after a preliminary period of a week on a normal diet engaged in heavy labor (chopping, sawing, and splitting oak logs; building breakwaters with large stones; and walking long distances) on a diet deficient in thiamin, probably deficient in nicotinic acid, pyridoxin, and pantothenic acid, and probably adequate in riboflavin, with other constituents presumably adequate. For half of the group the diet was supplemented with 2 mg. daily of thiamin hydrochloride, the others receiving placebos. After a week on this diet, 18 gm. of whole dried brewers' yeast was given each subject daily in place of the thiamin or placebo, and the work continued. At least once and sometimes twice a day each subject was given a fitness index test devised in the Harvard Fatigue Laboratory, and more extensive measurements of physical fitness were made on a treadmill at intervals. Other observations included 24-hr. urine analyses for thiamin, electrocardiograms, and measurements of heart size.

At the end of the first week all of the subjects complained of easy fatigue, and their physical fitness had deteriorated markedly. The subjects without thiamin showed greater deterioration and a majority of them also had symptoms of muscle and joint pains, lack of well-being, poor appetite, and constipation, all of these being mild or absent in the subjects receiving thiamin. Certain subjects in both groups showed changes in electrocardiograms, but there were no significant changes in heart size. The subjects not receiving thiamin had lower urinary thiamin values by the end of the week. Durng the yeast-treatment period, all symptoms disappeared and the usual level of fitness was regained, more rapidly by the group receiving thiamin than the other.

The authors conclude that men doing hard physical work even for a few days need an adequate daily intake of the vitamin B complex in order to maintain physical fitness.

Thiamin content of milk in relation to vitamin B_1 requirement of infants, E. M. Knott (*Amer. Jour. Pub. Health, 32 (1942), No. 9, pp. 1013–1017, illus. 6*).—In the assays reported for thiamin in various forms of milk preparations used in infant feeding, growth methods were used chiefly as proving most reliable of the various methods tried. The average thiamin content of boiled milk formulas was 24 μg. per 100 cc. and of pasteurized milk before boiling 26 μg., with a range of from 18 to 35 μg. per 100 cc. in the samples of both types tested; evaporated milk reconstituted with equal parts of water 19, with a range of from 13 to 27 μg. per 100 cc., and samples of breast milk from 17 women 9, with a range of from 3 to 18 μg. In four lots of milk tested for destruction of thiamin during processing, the losses ranged from 23 to 35 percent, with further losses on storage. Urinary excretion studies on 12 healthy infants for a total of 104 5-day periods showed consistently low excretion of thiamin up to an intake of 80 units or more daily.

In comparison with a cocarboxylase content of the blood of 5 μg., considered by the author on the basis of numerous analyses on adults to be a normal value for health, a few determinations on infants showed a decrease from 5 μg. or more at birth to levels between 3 and 4 μg., the amounts varying with the feedings and being lowest in manually expressed breast milk. In successive tests on two infants of different forms of milk, the one subject responding best to evaporated milk feeding received 190 μg. or 63 units of thiamin daily in the milk. The optimum cocarboxylase level of 5 μg. was secured, however, only after supplementing the milk with pure thiamin. It is thought that the 3- to 4-μg. level reached on the various milk formulas is adequate unless some condition increases the metabolic need of thiamin and that consequently the milk thiamin received by artificially fed infants may suffice until cereals and other foods are included in the diet.

In a note added as the paper went to press, it was announced that in additional work higher values for the thiamin content of breast milk had been obtained, with an average of 20.1 μg. per 100 cc. for women successfully nursing young infants.

Studies of biotin metabolism in man, I–III, T. W. Oppel (*Amer. Jour. Med. Sci., 204 (1942), No. 6, pp. 856–875, illus. 8*).—Work thus far completed in this extensive investigation is reported in three parts as follows:

I. *The excretion of biotin in human urine* (pp. 856–863).—The excretion of biotin in the urine of normal subjects and of a large number of patients with a variety of diseases was determined by the yeast growth method of Du Vigneaud et al. (E. S. R., 87, p. 624). Biotin was found to be present in the urine in the free form and was very stable. When the 24-hr. urine samples were collected in bottles to which glacial acetic acid had been added and stored in the ice box, no deterioration was observed even after a month. Normal subjects on unrestricted diets excreted from 14 to 111 μg. in 24 hr., with most of the values falling between 20 and 50 μg. On ordinary diets, the biotin excreted by an individual varied from day to day and throughout the day, an increase in amount following the ingestion of large doses of crude biotin. The excretion was greater in those who had a good diet than those with a poor one. Values in illness were within the normal range and did not decrease markedly during periods of starvation.

II. *The relationship between the biotin content of the diet and its output in the urine and feces* (pp. 863–869).—A small group of hospital patients was kept on diets of known but varied biotin content, and the excretion of biotin in both urine and feces was determined. Diets of average composition furnished from 30 to 40 μg. of biotin daily. The addition of liver to the diet brought the biotin content up to 65 μg. On constant daily biotin intakes the biotin excretion in the urine was quite constant for the individual subject but varied widely for different subjects. Increases of biotin in the diet on alternate days by the substitution of liver for beefsteak led to corresponding increases in the biotin content of the urine. The average daily biotin content of the feces greatly exceeded that of the diets, the total output in urine and feces being sometimes from three to six times as high as the intake in the diet. There was no correlation between the biotin content of the diet and the feces.

III. *The excretion of two biotin-like substances in urine* (pp. 869–875).—By the use of avidin it was found that the so-called biotin in the urine, as determined by the yeast growth method, consisted of two fractions, one of which was capable of combining with avidin and the other not. The avidin-combining fraction varied with the biotin content of the diet and is thought to be true biotin. The nonavidin-combining fraction was found in all urines tested and in amounts bearing no relation to the biotin content of the food or test doses administered. Only small amounts of this fraction were found in the foods and in the feces.

Response of bacteria, yeast, and rats to peroxide-treated biotin: Intestinal synthesis of biotin in the rat, E. Nielsen, G. M. Shull, and W. H Peterson. (Wis. Expt. Sta.). (*Jour. Nutr., 24 (1942), No. 6, pp. 523–533, illus. 1*).—It is reported that mild treatment of biotin-containing materials with hydrogen peroxide, 0.3 percent for 24 hr. at room temperature, renders the biotin ineffective for use by *Lactobacillus casei* and the rat but not for yeast. "From these results it appears that the use of oxidizing agents must be avoided in preparing biological materials for assay by the yeast method."

In order to study the synthesis of biotin in the intestinal tract of the rat, the basal ration of Nielsen and Elvehjem (E. S. R., 87, p. 599) was used, the casein being treated with Superoxol to destroy the biotin, and the sugar extracted with 100 percent ethyl alcohol. The purified ration contained 63.1 percent less biotin than the unpurified, supplying only 0.003 μg. daily. In other experiments rats were maintained for several weeks on the purified diet, with or without certain modifications, and the excretion of biotin in the urine and feces was determined. During a 6-week period on the purified diet alone, the average daily synthesis of biotin by two rats amounted to 295 mμg. and in the subsequent 3 weeks to 358 mμg. Rats on the stock ration showed a synthesis of biotin to a maximum of 1,960 mμg. per rat per day. On the purified ration with riboflavin removed the synthesis was decreased to an average of 152 mμg., and in the presence of sulfaguanidine the lowest value of all, 80 mμg., was reached.

Ascorbic acid values of fruits and vegetables for dietary surveys, M. Olliver (*Chem. and Indus., 62 (1943), No. 16, pp. 146–148*).—The values presented are based on many analyses, carried out over a 7-yr. period and employing the 2,6-dichlorophenolindophenol method with the technic of Harris and Olliver (noted on page 625). Analyses, reported for the foods in the state in which they are usually eaten, cover fresh and stewed fruits and jams (freshly prepared from sound, fresh fruit and containing 33 percent of fruit in the final jam), boiled vegetables, and raw salad vegetables. Consideration is given to the possible variations that may occur and the corresponding adjustments that should be made in using the figures for dietary calculations. The recommended adjustments include the following:

A 10-percent reduction in the values for each day of storage of green leafy vegetables and peas in the pod; a progressive decrease with increasing storage period in the value for boiled potatoes (from 16 mg. per 100 gm. in August and September when freshly dug to 2 mg. in March); a value for potato chips 20 percent higher than that for the boiled potatoes; an allowance for the time the vegetable is kept hot, varying in cooked cabbage, for example, from a 25-percent destruction of the vitamin in 15 min. to 75 percent in 90 min.; canned and bottled goods to be figured at the same ascorbic acid level as the corresponding cooked foods; no allowance for quick-frozen vegetables; variable allowances for dried foods but probably involving total destruction of the vitamin in products dried by older commercial or home methods; and no adjustment in the values for fruit juices upon storage up to 24 hr. after preparation.

Winter sources of vitamin C, H. W. Crowe and E. A. M. Bradford (*Nature [London], 151 (1943), No. 3835, p. 505*).—Ascorbic acid was determined by the indophenol dye titration procedure in several salad plants available in Great Britain in February and March, with the following results expressed as milligrams ascorbic acid per 100 gm. fresh material: Australian cress, *Lepidium (? sativum)*, 148; American cress, *Barbarea verna*, 108; Italian corn salad, *Valerianella eriocarpa*, 93; Nusslisalat (Swiss), *V. olitoria*, 55 and 84; and water cress, *Nasturtium officinale (=Rorippa nasturtium-aquaticum)*, 37 and 54 mg.

The carotene and ascorbic acid contents of peppers, E. M. Lantz (*New Mexico Sta. Bul. 306 (1943), pp. 14*).—Peppers (*Capsicum annuum*) of several varieties (including both hot and sweet), obtained for the most part from the station farm in the Mesilla Valley of southern New Mexico, were analyzed, when freshly picked (usually between 8 and 9 a. m.) at several stages of maturity, for carotene by the method of Moore (E. S. R., 85, p. 583) and for ascorbic acid by the method of Bessey (E. S. R., 82, p. 14). An Evelyn photoelectric colorimeter was used for both determinations.

The data indicated that with two exceptions all the peppers were rich in carotene and all were rich in ascorbic acid. Moreover, the ascorbic acid, and, particularly, the carotene content increased as the peppers ripened. Of the 9 varieties colored green when immature and red when ripe, the 60 samples analyzed when green contained from 1.1 to 10.8 μg. carotene per gram, while the 28 ripe samples ranged from 33.9 to 377 μg. per gram. The 2 varieties that were yellow when immature contained less than 1 μg. carotene per gram at this stage and not more than 42 μg. per gram when ripe (red). Ascorbic acid in 14 varieties, including the 2 of lighter color, analyzed when immature ranged from 42 to 558 mg. per 100 gm. (155 samples). Considered by varieties, there was an increase in ascorbic acid upon ripening, but this increase was not nearly so marked as in the case of carotene. Ascorbic acid in the 42 ripe samples ranged from 80 to 561 mg. per 100 gm. The ascorbic acid content of the green peppers was found to increase as the season advanced, and there appeared also to be a variation in ascorbic acid according to the time of day when they were gathered. Results of biological determinations of vitamin A in samples of fresh, canned, and dried chili indicated that the chemical determination of carotene by the method employed gave reliable information about the vitamin A value of peppers.

"Lesions found in the stomachs of some of the chili-fed rats were not caused by the chili, but were apparently the result of some deficiency of the basal diet."

Conserving vitamin C in potato cookery, J. E Richardson and H. L. Mayfield (*Montana Sta. War Cir. 1* [*1943*], *pp.* [*4*]).—Potatoes of the Netted Gem variety held in winter storage for several months, and averaging 9.1 mg. of ascorbic acid per 100 gm., were used in the cooking tests. Ascorbic acid determinations on the cooked potato, calculated back to the raw basis for comparison, showed that potatoes boiled in their jackets retained all of their ascorbic acid, whereas those pared and cut for boiling lost 18.7 percent; cooking loss from the pared, cut potatoes was reduced to 10.9 percent when the potatoes were cooked in a pressure saucepan under steam pressure of 15 lb. The practice of soaking pared, cut potatoes in water before cooking caused increased losses, these, with 4 hr. of soaking, amounting to 23.1 and 14.3 percent, respectively, in the boiled potatoes and those cooked in the pressure saucepan; holding potatoes in salted water (2.5-percent solution), however, reduced the cooking losses of these two methods to 15.4 and 5.5 percent, respectively. "The potatoes soaked in salt water lost some of their crispness but, when cooked, were exceptionally mealy and had a good flavor."

Vitamin C from green tomatoes, F. Wokes and J. G. Organ (*Nature* [*London*], *150* (*1942*), *No. 3809, pp. 523–524, illus. 1*).—This preliminary report shows that the loss of ascorbic acid in the pulping or chopping of tomatoes, due probably to the action of ascorbic acid oxidase, is much greater from green than from ripe tomatoes and is greater the finer the division of the material. Thus, 92 percent of the vitamin was destroyed in 7 min. in pulped green tomatoes, whereas in red ripe tomatoes only 27 percent was lost. Chopped into medium-sized pieces the green tomatoes lost only 18 percent of the vitamin upon standing overnight and in the same period only 11 percent if coarsely sliced. Preliminary results on the effect of ripening on the ascorbic acid content of tomatoes indicated no significant difference between the average ascorbic acid content of ripe and unripe tomatoes and no difference between small and large tomatoes in concentration of the vitamin.

The effect of storage and cooking on the vitamin C content of turnip greens, L. McWhirter (*Miss. Farm Res.* [*Mississippi Sta.*], *6* (*1943*), *No. 6, pp. 1, 2*).—A study conducted cooperatively in Louisiana, Georgia, Mississippi, Oklahoma, and Virginia showed that turnip greens held at refrigerator temperature (approximately 40° F.) for 24 hr. lost only about 4 percent of their ascorbic acid, whereas those held at room temperature lost as much as 28 percent on an average. Moreover, the greens stored under the unfavorable condition of the higher temperature lost more of their ascorbic acid upon cooking than did those properly stored during the interval between harvest and preparation for table use. Thus, turnip greens cooked for 30 min. immediately after picking lost on an average 26 percent of their original vitamin content; those cooked for 30 min. after 24 hours' storage in the refrigerator lost on an average only 28 percent, while the ones cooked after 24 hr. at room temperature lost 33 percent. Cooking for the unnecessarily long period of 4 hr. intensified the ascorbic acid losses, which increased to 66 percent for the unstored greens, to 67 percent for the greens stored at 40°, and to 74 percent for those stored at room temperature.

Reduced and total vitamin C in milk, D. B. Hand. (Cornell Univ.). (*Jour. Dairy Sci., 26* (*1943*), *No. 1, pp. 7–12, illus. 2*).—For the determination of the total vitamin C in milk, any dehydroascorbic acid present was reduced by treatment with a suspension of *Bacterium coli* prior to titrating with 2.6-dichlorophenolindophenol. Milk from individual cows taken directly in brown bottles and titrated immediately averaged 23.4 mg. reduced ascorbic acid per liter and 23.5 mg. total vitamin C, thus indicating that at milking there is no dehydroascorbic acid in milk. Upon storage of the milk, there was some conversion of the reduced ascorbic acid to the dehydro form; from 1 to 6 mg. of dehydroascorbic acid per liter was found in commercial mixed milk that was not exposed to light or contaminated with copper. Data on commercial raw milk samples stored at 1° C. and tested at intervals up to 6 days indicated that the amount of dehydroascorbic acid present in the milk at any time depended on the rate of formation and the rate of destruction. As the ascorbic acid disappeared from the milk, the rate of replenishment of the dehydroascorbic acid became slower. The presence of copper as a contamination was found to increase the accumulation of the dehydroascorbic acid. Pasteurization (in half-filled quart bottles for 30 min. at 63° with protection from light) destroyed most of the dehydroascorbic acid. However, in commercially pasteurized milk additional amounts of dehydroascorbic acid were formed by the time the milk was bottled and ready for delivery. In pasteurized deaerated milk the vitamin C was entirely in the form of reduced ascorbic acid.

Renal threshold for ascorbic acid in twelve normal adults, with a note on the state of tissue reserves of subjects on an intake of ascorbic acid approximating the suggested daily allowance, J. S. Lewis, C. A. Storvick, and H. M. Hauck. (Cornell Univ. et al.). (*Jour. Nutr., 25 (1943), No. 2, pp. 185–196, illus. 1*).—The renal threshold for ascorbic acid was estimated for 4 men and 8 women, with from 33 to 93 determinations on the individual subjects covering a range of values on either side of the threshold. The diet of 4 of the subjects, and in some of the tests of 2 others, was the same as previously reported by Belser et al. (E. S. R., 82, p. 428). For the remainder of the tests certain changes in the diet were made to insure its adequacy in terms of the allowances of the National Research Council. The ascorbic acid content of the modified diet was approximately 14 mg. daily and was supplemented by ascorbic acid in varying amounts (E. S. R., 88, p. 419).

The renal thresholds for the entire number ranged from 1.1 to 1.8 mg. per 100 cc., with 10 of the subjects having values between 1.1 and 1.3 mg. For 9 of the subjects data were available on the mean fasting plasma ascorbic acid values during tissue saturation. For 5 of these the estimated renal thresholds were approximately the same as these values, for 3 the estimated threshold value was slightly higher, and for 1 slightly lower. "The optimum plasma ascorbic acid content for health is not known, but obviously a person with a high renal threshold can maintain a given plasma ascorbic acid level on a lower intake of ascorbic acid than can a person with a low renal threshold for this substance."

In a series of tests in which 6 subjects received 74 mg. (approximately the daily allowance of the National Research Council) of ascorbic acid daily for from 12 to 14 days, 3 maintained tissue saturation as measured by the excretion of at least half of the test dose in 24 hr., and the other 3 showed slight depletion of tissue reserves. All 6 of the subjects had mean fasting plasma ascorbic acid levels lower than the estimated renal threshold and lower than the mean fasting plasma values on daily intakes of over 200 mg. It is considered that more data are needed to determine whether longer periods on the recommended daily allowance would result in depletion of the tissue reserves in some of the subjects or whether they would become adjusted to the level of intake.

The authors had the cooperation of I. Patterson, S. Higano, and B. Hawthorne.

The effect of ascorbic acid (vitamin C), calcium ascorbate, and calcium gluconate on the regeneration of bone in rats, G. Bourne (*Quart. Jour. Expt. Physiol. and Cog. Med. Sci., 31 (1942), No. 4, pp. 319–331, illus. 1*).—The new technic described for the estimation of the power of a substance to regenerate bone produced the bone lesions not by fracture but by boring through the bone cortex of the femur of the anesthetized rat with a dentist's twist drill of 1-mm. bore. Lesions thus obtained in a series of animals were identical. After injury the rats were injected daily during the healing period with the test substances. At the end of the experiment the rats were sacrificed and the femurs were removed, fixed, stained, imbedded, and sectioned for study. The degree of formation of temporary membrane bone, used as an indication of the degree of the healing process, was estimated from projection drawings (magnification 100 ×) of serial sections through the area of healing; an estimation of the amount of trabeculae formed in a standard rectangular area in the region of healing was made by weighing the trabecular area cut from the projected tracing on paper, and comparing this weight with the weight of the standard rectangle cut from the same paper. By application of this technic, an estimate was made of the influence of various injected substances on the rate of healing. Preliminary trials indicated that a 7-day healing period permitted the formation of an appreciable number of trabeculae.

By this procedure it was found that calcium ascorbate in amounts of 50 mg daily (equivalent to 5 mg. Ca) injected subcutaneously into rats on an adequate diet statistically increased the amount of bone regeneration in 7 days as compared with negative controls injected with normal saline. Neither ascorbic acid nor calcium-glucono-galacto-gluconate in the doses given accelerated the healing of the bone.

Comparative toxicity of three forms of vitamin D for albino rats, R Mrazek, C. R. Novak, and C. I. Reed. (Univ. Ill.). (*Soc. Expt. Biol. and Med. Proc., 51 (1942), No. 1, pp. 49–50, illus. 1*).—The survival periods of adult stock colony rats receiving daily supplements of vitamin D administered by stomach tube in doses of 75 units per gram of body weight were taken as a measure of the toxicity of the three forms of vitamin D used. In the group receiving activated 7-dehydrocholesterol in sesame oil, the first rat was found dead on the eleventh day, the last one (the ninth) on the sixty-seventh day; of the rats receiving calciferol in corn oil, the first one succumbed on the twenty-third day, the last one (the twelfth) on the seventy-fifth day; the first rat in the group receiving ertron (an electrically activated ergosterol) in the corn oil died on the forty-third day and the last one (the eleventh) died on the one hundred and fourteenth day. In general there was little distinction between the two sexes in survival time. Since the antirachitic dose of each preparation was the same, it is concluded that the fatal outcome of toxication was conditioned, at least, by some other factor not expressed by antirachitic units.

HOME MANAGEMENT AND EQUIPMENT

Some effects of the first year of war upon Nebraska farm families, L. H. Stott (*Nebraska Sta. Bul. 348 (1943), pp. 22, illus. 2*).—The investigation here reported was undertaken (1) to find out to what extent Nebraska farm families, particularly the women, are facing and handling work adjustment problems resulting from the war, and (2) to determine some of the effects of the adjustment problems on the character of farm family life. Information was obtained by the questionnaire method from more than 450 farm young people, 84 percent of whom were students (mostly seniors) in 11 high schools in the State and the remainder freshmen in the college of agriculture of the State university.

The loss of family members to the armed forces, war industries, etc., amounted to 357 individuals or an average of 0.78 individual per family. In spite of a greater number of acres and heavier yields per acre during the year (1942), approximately 19 percent of the families had less hired help than in 1941, and only 12 percent had more help. In 1941 only about 25 percent and in 1942 about 35 percent of the mothers did field work. Although the greater number of women field workers were from homes that had lost no members in 1942, those from homes that had lost personnel spent considerably more time in the field than previously. The proportion of mothers doing "chores usually done by men and boys" rose from a little more than half of the number in 1941 to nearly two-thirds in 1942, and there was an increase of 50 percent in the time spent by the women on such chores. More than 90 percent of the families had successful home gardens in 1942, and in about 79 percent of the cases the women had taken over the complete job.

The effects of war conditions upon family life, as reported by the adolescent members of the family, were both favorable and unfavorable. Among the favorable effects were greater frequency of good times in the home and less irritability and conflict in the family group, and among the unfavorable a tendency of the parents, particularly those in families that had lost members, to show more worry and nervousness. An increase in field work done by the mother associated with loss of family personnel tended to result in more worry, nervousness, and irritability. Doing chores for the first time tended to have more unfavorable effects than increasing the time previously spent in such jobs.

"The general conclusion regarding the effects of the war situation on farm families is that at the end of the first war year they tend slightly to be favorable. Of the factors considered, only the loss of family personnel and some of the work adjustments associated with such loss were found to have affected adversely farm family life in Nebraska."

REPORTS AND PROCEEDINGS

Report on the agricultural experiment stations, 1942, J. T. JARDINE ET AL (*U. S. Dept. Agr., Off. Expt. Stas., Rpt. Agr. Expt. Stas., 1942, pp. 122+*).—This report consists mainly (pp. 8–106) of a review of progress in agricultural and rural-life research during the fiscal year ended June 30, 1942. A special section is included on adjustments for wartime service.

Appended statistics show that the total income available to the stations for 1942 was $22,664,840.99 as compared with $22,433,550.29 in 1941. Federal grants to the States, Territories, and Puerto Rico in 1942 amounted to $6,926,207.08 as compared with $6,862,500 in 1941. The amount of funds made available by the States in 1942 was $15,738,633.91 as compared with $15,571,050.29 in 1941, an increase of $167,583.62. The income of the stations from sources other than Federal-grant funds was approximately $2.27 for each $1 of income from the Federal grants. The number of research workers on the station staffs in 1942 was 4,927, an increase of 172 over 1941. Full time to research was given by 2,404 workers, while the time of the other 2,523 was devoted partly to research and partly to resident teaching or extension work or both.

The publications of the experiment stations in 1942 included 975 bulletins and circulars in the regular series, 2,157 articles in scientific journals, and 670 miscellaneous publications. The comparable figures for 1941 were 834, 2,411, and 701, respectively.

Annual Report [of Florida Station], 1942, W. NEWELL (*Florida Sta. Rpt. 1942, pp. 216+, illus. 20*).—In addition to data noted elsewhere in this issue, brief progress reports are given on the various projects of the station, substations, and field laboratories in agricultural economics, agronomy, animal industry (including pathology), entomology, home economics, horticulture, plant pathology, and soils.

Science solves farm problems and aids agricultural production: Fifty-fifth Annual Report of [Indiana Station], 1942, H. J. REED and W. V. LAMBERT (*Indiana Sta. Rpt. 1942, pp. 108+, illus. 13*).—In addition to articles noted elsewhere in this issue, this report contains brief project summaries of the year's work in animal science, agricultural economics, farm and home equipment and engineering, foods and food products, forestry and wildlife, insects, plant science, chemistry, soil science, and the agricultural inspection service and on the outlying station farms.

Biennial Report of the Northeast Louisiana Experiment Station, 1941–42, St. Joseph, Louisiana, C. B. Haddon (*Louisiana Sta., Northeast Louisiana Sta. Bien. Rpt. 1941–42, pp. 40*).—In addition to work abstracted on pages 687 and 711, this report contains meteorological observations at St. Joseph; variety tests with cotton, corn, oats, wheat, barley, and soybeans; cultural and fertilizer tests with cotton and corn; clipping tests with oats, barley, rye, and wheat; and pasture studies.

Greater farm production for Nebraska: Fifty-sixth Annual Report of [Nebraska Station, 1942], W. W. Burr (*Nebraska Sta. Rpt. [1942], pp. 95, illus. 16*).—This report briefly summarizes the progress of the year's studies with soils; field crops; horticultural crops; plant diseases; the chemistry of plant materials; insects and rodents; feeding cattle, hogs, and sheep; dairy production and manufacture; poultry nutrition and management; animal diseases (noted in part on p. 728); agricultural engineering; rural economics; and home economics; and at the outlying farms and substations.

MISCELLANEOUS

Treatment of experimental data, A. G. Worthing and J. Geffner (*New York: John Wiley & Sons; London: Chapman & Hall, 1943, pp. 342+, illus. 95*).—In view of numerous errors and omissions in the presentation of experimental data, suggestions are given for the statistical treatment and presentation mainly of physical, chemical, and engineering data.

Influence of unknown factors on the validity of mathematical correlations of biological data, E. L. Welker and F. L. Wynd. (Univ. Ill.). (*Plant Physiol., 18 (1943), No. 3, pp. 498–507, illus. 3*).—The purpose of the present paper is to call attention as precisely as possible to the manner in which erroneous conclusions may enter into the interpretation of phenomena studied by biometric methods. "Groups of biological data obtained under different conditions cannot be pooled in an effort to increase the significance of statistical correlations by increasing the number of pairs of variates. Direct correlation procedures are inadequate to prove or disprove inherent relationships between some biological characteristics, because factors, usually of unknown nature, may falsely exaggerate or diminish the numerical magnitude of the observed correlation coefficient. These factors may even change the algebraic sign of correlations obtained from the pooled data. Under certain conditions, consistency of sign of a number of correlations may be used to establish relationships, even though the conditions of the experiment may preclude the usual statistical methods of establishing the numerical magnitude of any single correlation coefficient."

Mississippi Farm Research, [June 1943] (*Miss. Farm Res. [Mississippi Sta.], 6 (1943), No. 6, pp. 8, illus. 12*).—In addition to articles noted elsewhere in this issue, this number includes Farm Income of State and Nation at High Level, Outlook Favorable, by F. J. Welch (p. 7), and Insect Damage to Timber Prevented by Proper Care, by C. Lyle (p. 8).

Bimonthly Bulletin, Ohio Agricultural Experiment Station, [May–June, 1943] (*Ohio Sta. Bimo. Bul. 222 (1943), pp. 103–156, illus. 10*).—In addition to articles noted elsewhere in this issue, this number contains How To Meet Wartime Poultry Feeding Problems, by D. C. Kennard (pp. 110–113), and Index Numbers of Production, Prices, and Income, by J. I. Falconer (p. 156).

NOTES

Arkansas Station.—Recent appointments include Dr. N. W. Hilston, assistant professor and assistant in dairy husbandry in the New Mexico College and Station, as assistant professor of animal industry and Virgil B. Fielder as assistant professor of rural economics and sociology.

California University and Station.—*Science* notes that W. W. Mackie retired as agronomist on July 1, the activities of the division of agronomy being transferred from Berkeley to Davis. Robert W. Hodgson, head of the division of horticulture in the College of Agriculture at Los Angeles, has succeeded Dr. William H. Chandler as assistant dean of that college.

Connecticut [New Haven] Station.—In place of the usual field day at the station farm in Mount Carmel, the station substituted an open house at its headquarters in New Haven on September 8.

Edward J. Rubins, research assistant in soils, has resigned to join the Division of Soil and Fertilizer Investigations, U. S. D. A. Bureau of Plant Industry, Soils, and Agricultural Engineering, at Beltsville, Md.

New Hampshire University and Station.—An insectary greenhouse, measuring 32 by 50 ft. and adjacent to the existing laboratory of the entomology department, is under construction. This new structure will be more accessible to the staff of the department and will release additional space at the university greenhouse for use in horticulture. It will also facilitate more accurate results in the search for substitutes for chemical and organic compounds not now available.

A Beckman spectrophotometer and a Klett fluorimeter-colorimeter have been added to the equipment of the department of agricultural and biological chemistry. These will add greatly to the facilities for vitamin studies. The department has recently undertaken a new study of the carbohydrates of pasture and hay crops as related to their utilization by cattle. The purpose is to determine whether or not chemical analysis can give definite indication of the value of hay as a source of energy for cattle.

The nutrition laboratory is initiating a new phase of studies with lactating cows, which deals with the physiological utilization of immature pasture grass. In this study the agronomy department will produce a stand of pure timothy, the department of agricultural and biological chemistry will conduct chemical determinations, the dairy department will study the composition of the milk, and the nutrition laboratory will conduct metabolism experiments and study digestion balances that should determine the nutritive value and measure of utilization. This collaboration by departments is largely a matter of continuing existing projects in which the personnel are actively engaged.

Dean Hosken, instructor and research assistant in agricultural economics, has resigned. Raymond W. Barratt has been appointed instructor and research assistant in botany.

Vermont University and Station.—A new garage and field house for the agronomy department has been completed. Dr. Betty F. Thomson, assistant botanist and instructor in botany, has resigned to accept a position in Connecticut and has been succeeded by Dr. Elizabeth McCracken. K. E. Varney and R. D. Halligan have been appointed assistant agronomists.

INDEX OF NAMES

Aamodt, O. S., 347.
Åberg, E., 194.
Abraham, E. P., 480.
Abrahamsen, M. A., 496.
Abramson, H. A., 15.
Abshier, G. S., 385.
Ackerman, F. G., 414.
Acree, F., Jr., 17.
Adair, C. R., 664.
Adam, D. B., 227.
Adam, W. B., 761.
Adams, D. F., 161.
Adams, J. A., 408.
Adamson, R. M., 67.
Addicott, F. T., 426.
Addy, C. E., 706.
Adolph, W. H., 756.
Adsuar, J., 214.
Afanasiev, M. M., 511.
Agner, K., 147.
Ahalt, A. M., 387.
Ahlgren, G. H., 51, 437.
Ahlgren, H. L., 754.
Ahmad, B., 756.
Ainsworth, G. C., 292.
Airola, E., 36.
Aitkenhead, W., 407.
Akamine, E. K., 443.
Akeley, R. V., 207, 652.
Akers, T. F., 57.
Albaum, H. G., 190, 425.
Alberts, H. W., 536.
Albertson, F. W., 293, 423.
Albrecht, H. R., 64.
Albrecht, W. A., 29, 172, 175, 297.
Alcayaga, R., 591.
Aldebert, 269.
Alder, B., 108.
Alderfer, R. B., 171.
Alderman, W. H., 68.
Alexander, F., 484.
Alexander, L. T., 174.
Alexander, W. H., 741.
Alexopoulos, C. J., 641.
Alford, J. A., 691.
Alicata, J. E., 368.
Allaway, W. H., 183.
Allbritten, H. G., 619.
Allen, B. B., 18.
Allen, C. E., 523.
Allen, D. E., 586.
Allen, D. I., 540.
Allen, G. M., 89.
Allen, H. R., 635.
Allen, H. W., 713.
Allen, M. W., 323.
Allen, P. H., 249.
Allen, R. C., 219.
Allen, T. C., 310, 564.
Allen, W. H., 579.
Allison, C. C., 332.
Allison, J. L., 323.
Allison, L. E., 419.
Allison, R. V., 178.
Allmendinger, D. F., 669.
Allred, C. E., 124, 128, 383.
Allred, W. J., 236.
Almack, R. B., 602.
Almquist, H. J., 353, 580, 581.
Alsever, J. B., 612.
Altstatt, G. E., 67.
Alvarez, L. A., 230.
Amstein, W. G., 312.
Anantha Rao, N. K., 37.
Andberg, W. G., 362.
Andersen, A. A., 156.
Andersen, A. L., 86.
Andersen, E. M., 618.
Anderson, A. B. C., 631.
Anderson, C. A., 131, 740, 749.
Anderson, D., 416.
Anderson, D. A., 546.
Anderson, D. B., 662.
Anderson, E. B., 111.
Anderson, E. J., 143.
Anderson, H. G., 462.
Anderson, H. O., 659.
Anderson, H. W., 331, 332, 543, 681.
Anderson, K., 407.
Anderson, K. L., 53, 55.
Anderson, L. D., 562, 570.
Anderson, L. P., 725.
Anderson, P. J., 442, 457.
Anderson, R. H., 408.
Anderson, S. A., 407.
Anderson, T. F., 684.
Anderson, T. G., 475.
Anderson, W., 382.
Anderson, W. A., 129, 131, 391, 392, 753.
Anderson, W. S., 82, 214, 319, 442, 495, 657.
Andrewartha, H. G., 463.
Andrews, A. C., 20.
Andrews, E. A., 79.
Andrews, F. N., 46, 119, 304, 361, 531, 718, 719, 729.
Andrews, J., 98.
Andrews, J. C., 755.
Andrews, J. S., 117, 360, 485, 726.
Andrews, W. B., 31, 163, 295, 439, 706.
Anker, G. A., 21, 165.
Anker, D. L. W., 382, 494.
Annand, P. N., 561.
Anthony, J. L., 180, 439.
Anthony, S., 753.
Apple, J. W., 340.
Apple, S. B., 68.
Appleby, A., 656.
Appleman, C. O., 427.
Arceneaux, G., 211.
Archibald, J. G., 280, 357.
Ardrey, W. B., 590.
Arentsen, S. S., 699.
Arias, A. C., 25.
Armand, J. E., 91.
Armitage, H. M., 92.
Armstrong, J. M., 42.
Armstrong, T., 707.
Armstrong, W. H., 118.
Arndt, C. H., 454.
Arnold, C. H., 337, 342, 561.
Arnold, J. F., 335.
Arnold, P. T. D., 109.
Arnold, R. B., 356.
Arnold, R. T., 16.
Arnon, D. I., 667.
Arnott, D. A., 91, 707.
Arnow, L. E., 275.
Arny, A. C., 53, 213.
Aronoff, S., 298.
Artschwager, E., 316.
Asai, G. N., 219.
Ascham, L., 506.
Ashbrook, F. G., 722.
Ashby, R. C., 261.
Ashley, T. E., 57, 657.
Ashworth, U. S., 23.
Asmundson, V. S., 353, 379.
Astbury, W. T., 147.
Atkeson, F. W., 43, 108, 240, 301, 344.
Atkins, I. M., 51, 226.
Atkins, R. E., 663.
Atkinson, A., 142.
Atkinson, J. D., 697.
Atkinson, N., 33, 291
Atwood, C. E., 576.
Atwood, S. S., 56, 652.
Ault, W. C., 155.
Ausemus, E. R., 225.
Avens, A. W., 566.
Avery, G. S., Jr., 425.
Avery, J. L., 118.
Avery, T. B., 579.
Axelrod, A. E., 106.
Axelrod, B., 16.
Ayers, A. D., 427.
Ayers, F. T., 558.
Aykroyd, W. R., 756.
Ayres, T. B., 263.
Azar, E., 183.

Babel, F. J., 111, 357.
Babicka, M., 765.
Bachman, W. E., 410.

Bacon, J. S. D., 756.
Bacon, L., 496.
Badri Nath Mohan, 592.
Bailey, C. H., 21, 22, 142.
Bailey, E. A., Jr., 104.
Bailey, E. H., 172.
Bailey, E. M., 185, 482.
Bailey, J., 8.
Bailey, J. S., 314, 706.
Bailey, L. H., 34.
Bain, D. C., 82, 690.
Baines, R. C., 618.
Baitsell, G. A., 526.
Baker, A. D., 338, 707.
Baker, A. L., 655.
Baker, C. E., 673.
Baker, D., 37.
Baker, D. W., 99, 485.
Baker, E. W., 337, 471.
Baker, F. E., 565.
Baker, G., 619.
Baker, H., 91.
Baker, J. R., 284.
Baker, K. F., 557, 701.
Baker, M. L., 44, 302.
Baker, N., 338.
Baker, R. E., 300.
Baker, R. E. D., 88, 221.
Baker, T. A., 474.
Balch, R. E., 100, 242.
Bald, J. G., 455, 456.
Balduf, W. V., 94.
Baldwin, H. I., 680.
Baldwin, H. R., 164.
Baldwin, J. L., 25.
Ball, C. D., 277.
Ball, C. O., 263.
Ball, E. P., 735.
Ballinger, R. A., 124, 741, 748.
Balls, A. K., 19.
Balog, E., 603, 604.
Bamford, R., 197.
Bang, F. B., 113, 574, 590.
Banks, W. C., 487.
Bannan, M. W., 431.
Bantz, A. C., 185.
Barbee, O. E., 443.
Barber, F. W., 357.
Barber, G. W., 337, 561, 706.
Barber, M. A., 99.
Barbour, T., 706.
Barham, H. N., 1, 152.
Barlow, F. D., Jr., 386.
Barlow, H. W. B., 708.
Barlow, O. W., 12.
Barmington, R. D., 376.
Barnes, B., 403.
Barnes, D. F., 337.
Barnes, R. H., 436, 755, 760.
Barnes, W. C., 208, 542, 543.
Barnett, C. E., 353.
Barnhart, C. S., 93, 237, 340, 706.
Barnum, E. R., 276.
Barratt, R. W., 780.
Barre, H. J., 618.
Barrett, L. I., 546, 680.
Barrick, E. R., 103.
Barron, J. H., 619.
Barrons, K. C., 667.
Bartholomew, E. T., 285, 428, 651.
Bartholomew, R. P., 55.
Bartlett, D. E., 362.
Batchelder, E. L., 770.
Batchelor, H. W., 54, 271, 290.
Batchelor, L. D., 447.
Bateman, G. Q., 108.
Bateman, H. P., 374.
Baten, W. D., 219, 446.
Bates, J. C., 194, 286.
Bates, M., 239.
Bates, R. W., 203.
Batjer, L. P., 28, 69, 215.
Batson, F. S., 679.
Batten, E. T., 440.
Bauer, D., 72.
Bauer, F. C., 418.
Baum, H. M., 642.
Baumann, C. A., 114.
Baumann, L., 532.
Baumann, R. V., 735.
Baumgras, P. S., 89.
Baver, L. D., 29.
Bawden, F. C., 230, 689.
Bayfield, E. G., 22, 213.
Baylis, G. T. S., 693.
Beach, E. F., 137.
Beach, J. R., 361, 486.
Beachell, H. M., 298.
Beal, J. A., 345.
Beale, O. W., 176.
Beall, G., 91.
Beall, J. A., 132, 500.
Beamer, R. H., 118, 467.
Bear, F. E., 3, 30, 181, 633.
Bear, R. S., 274.
Beard, D., 368.
Beard, J. W., 368.
Beard, R. L., 94, 572.
Bearse, G. E., 244.
Beath, O. A., 236.
Beattie, H. G., 263, 395, 606.
Beattie, J. H., 61, 310, 666.
Beattie, W. R., 61, 66, 67, 68.
Beaumont, A. B., 522.
Beaumont, J. H., 508.
Beaver, P. C., 112.
Beck, G. H., 48.
Beck, P. G., 381.
Beckel, A. C., 153, 664.
Becker, R. B., 109.
Beckwith, C. S., 315.
Becnel, I. J., 711.
Bedard, W. D., 95.
Bedford, C. L., 763.
Beebe, J. M., 32.
Beecher, W. J., 706.
Beer, J., 90.
Beeskow, H. C., 411.
Beeson, K. C., 668.
Beeson, W. M., 590.
Beetle, A. A., 186.
Belcher, D. J., 518.
Bell, F. H., 648.
Bellrose, F. C., Jr., 462, 559.
Belton, H. L., 379.
Bender, G. L., 93.
Bender, R. C., 401.
Bendigo, B. B., 567.
Benedict, F., 394.
Benedict, H. M., 55.
Bengtson, N. A., 131.
Benne, E. J., 13.
Benner, J. W., 243, 724.
Bennett, C. W., 692.
Bennett, E., 17, 280.
Bennett, H. H., 255.
Bennett, H. W., 439.
Bennett, J. B., 381.
Bennett, M. K., 122, 261.
Bennett, R. E., 34.
Benson, L., 292.
Berg, B. N., 768.
Berg, L. R., 244.
Bergdoll, M. S., 205.
Berger, J., 425.
Bergman, A. J., 47, 199, 409.
Bergner, A. D., 655.
Berkeley, G. H., 554.
Berliner, V. R., 116.
Bernstein, L., 647.
Berry, M. H., 354.
Berryman, G. H., 139.
Bertrand, A. L., 735.
Bertrand, P., 230.
Bertullo, W. A., 190.
Bethke, R. M., 101.
Beutner, E. L., 416.
Bibby, B. G., 756.
Bickerton, J. M., 233.
Biebel, J. P., 446.
Biefeld, L. P., 161.
Biester, A., 602.
Biester, H. E., 369.
Bigger, J. H., 562.
Bingham, R. T., 235, 558.
Binkley, A. M., 62, 214, 307, 406, 762.
Binney, T. H., 357.
Bird, E. W., 623.
Bird, H. R., 472, 474, 581.
Bird, J. J., 266.
Birkinshaw, J. H., 186.
Bisbey, B., 502.
Bisby, G. R., 292, 638.
Bishop, D. W., 304.
Bishop, L. K., 99, 575.
Bishop, M. B., 574.
Bishopp, F. C., 98.
Biskind, G. R., 48, 656.
Biskind, M. S., 48.
Bitancourt, A. A., 449, 556, 699.
Bitters, W. P., 270.
Bjorka, K., 496, 600.
Black, C. A., 181.
Black, D. A. K., 769.
Black, H. C., 263.
Black, J. D., 122, 381.
Black, L. M., 327, 690.

Black, W., 688.
Black, W. H., 301, 348.
Blackman, M. W., 95, 241.
Blackwelder, R. E., 95.
Blackwell, E., 320.
Blair, G. W. Scott, 111.
Blair, J. S., 263.
Blair, T. A., 413.
Blakemore, F., 361.
Blakeslee, L. H., 431.
Blanch, G. T., 383, 617, 736, 737, 744.
Blasehko, H., 284.
Blaser, R. E., 60, 437.
Blauvelt, W. E., 466.
Bledsoe, R. P., 59.
Bledsoe, R. W., 618.
Bless, A. A., 433.
Bloch, E., 755.
Bloch, R., 299.
Blodgett, E. C., 74, 460.
Blodgett, F. M., 228.
Blood, P. T., 310.
Blosser, R. H., 745, 746.
Blum, H. B., 609, 761.
Blum, J. C., 602.
Blumenthal, H. T., 45.
Blunn, C. T., 432.
Blye, C. E., 724.
Boardman, H. P., 280.
Bobb, M. L., 237, 342, 466.
Bodine, W. E., 697.
Bodine, J. H., 708.
Bodman, G. B., 173.
Boehrer, J. J., 614.
Bogan, E. J., 2.
Bogart, R., 49, 471, 472.
Bogert, L. G., 764.
Boggess, T. S., Jr., 440.
Boggs, M. M., 23.
Bohart, R. M., 708.
Bomhard, M. L., 34.
Bond, M. E., 513.
Bond, T. E. T., 221.
Bondurant, J. H., 744.
Bonnar, R. U., 159.
Bonnen, C. A., 122, 597.
Bonner, F., 698.
Bonner, J., 426, 641.
Bonsma, H. C., 719.
Bonsteel, J. A., 632.
Bookhout, B. R., 596.
Borden, A. D., 563.
Borden, R. A., 404.
Borden, R. J., 63, 541.
Borg, A. F., 291.
Borg, W. T., 381.
Borgeson, C., 58.
Borgmann, A. R., 240, 344.
Bornstein, S., 588.
Borsook, H., 755, 766.
Borst, H. L., 659.
Borthwick, H. A., 649.
Bosher, J. E., 230.
Boswell, V. R., 66.
Botkin, C. W., 204.
Bottcher, E. J., 424.
Bottum, J. C., 124.
Boucher, D., 244.
Boughton, D. C., 363.
Bourne, A. I., 706.
Bourne, G., 284, 621, 776.
Boutwell, R. K., 758.
Bower, C. A., 28.
Bowic, A., 268.
Bowman, D. H., 40, 319.
Bowman, M. J., 740.
Boyce, A. M., 92, 93, 237, 340.
Boyce, E. F., 718.
Boyce, H. R., 707.
Boyd, J. C., 724.
Boyd, M. J., 162.
Boyd, O. C., 74, 319.
Boyd, W. L., 588, 724.
Boyden, M., 166, 628.
Boyer, P. D., 146.
Boynton, D., 313, 695.
Bozicevich, J., 118.
Bradbury, J. T., 531.
Bradfield, R., 30, 183.
Bradford, E. A. M., 774
Bradford, R. H., 743.
Bradley, A. V., 132.
Bradley, G. H., 98, 343.
Bradshaw, H. C., 128, 260.
Bradt, O. A., 69.
Branaman, G. A., 578.
Brandes, E. W., 430, 448.
Brandrup, L. A., 489.
Brandt, G. W., 43.
Branion, H. D., 474.
Brannen, C. O., 407.
Brannon, L. W., 563, 706.
Branson, F. A., 338.
Brase, K. D., 671.
Brasher, R., 559.
Bratley, C. O., 556.
Braude, R., 721.
Braun, A. C., 76, 222, 550.
Braun, A. E., 151.
Braun, E., 345.
Braun, E. L., 545.
Brautlecht, C. A., 24.
Bray, M. M., 137.
Bray, R. H., 29, 280, 521.
Brazil, O. V., 298.
Breazeale, D. F., 623.
Breed, R. S., 31, 636.
Brehm, C. E., 272.
Brent, B. J., 531.
Brentzel, W. E., 455.
Brereton, J. G., 7.
Brett, C. H., 408.
Brewer, C. M., 565.
Briegleb, P. A., 71, 220.
Brien, R. M., 697.
Brierley, W. G., 68, 217, 674, 675.
Briggs, G. B., 645.
Briggs, G. M., Jr., 579, 580.
Briggs, H. M., 105, 484.
Brigham, G. D., 361.
Brigham, R., 268.
Brightwell, W. T., 544.
Brimhall, B., 9.
Brimley, C. S., 559.
Brimley, H. H., 559.
Brinkerhoff, L. A., 68.
Briscoe, C. F., 295.
Brissenden, E., 293.
Briton, J. W., 655.
Britton, J. E., 695.
Britton, J. W., 115, 117, 729.
Broadbent, B. M., 712.
Broadbent, D. A., 130, 617, 736, 737, 744.
Broadfoot, W. C., 79.
Broadhurst, J., 114.
Brock, F. D., 469.
Brody, S., 399, 578, 584.
Broel, A., 706.
Bromley, S. W., 561, 576.
Brooks, A. R., 574.
Brooks, C., 232, 556.
Brooks, J. W., 564.
Brouha, L., 771.
Brown, A. G., 216.
Brown, A. P., 265.
Brown, A. W. A., 463.
Brown, B. A., 428.
Brown, B. E., 62, 183, 209, 684.
Brown, D. S., 69, 332, 673.
Brown, E., 225, 537.
Brown, E. M., 537, 642.
Brown, G. H., 6.
Brown, H. B., 59, 206, 662.
Brown, H. E., 238, 467, 574.
Brown, J. B., 54.
Brown, L. H., 385, 599.
Brown, O. J., 98.
Brown, R., 426.
Brown, R. L., 663.
Brown, S. M., 88, 699.
Brown, W. C., 623.
Browning, G. M., 175.
Broyer, T. C., 164, 427.
Brubaker, R. W., 566.
Bruce, W. N., 346.
Brumfield, R. T., 197, 650.
Brunauer, S., 273.
Brundage, R. C., 221.
Bruner, D. W., 250, 251, 360.
Brunk, M. E., 738, 745.
Brunner, J. R., 110.
Brunson, A. M., 589.
Brunstetter, B. C., 636.
Brunt, D., 166.
Bryan, C. S., 475, 584, 589.
Bryan, G. S., 523.
Bryant, L. R., 696.
Bryson, B. E., 135.
Buchanan, M. T., 493, 494, 738.
Buchanan, R. E., 508, 616.
Buckhannan, W. H., 170.
Buckman, H. O., 517.
Buckman, S. J., 120.
Buckner, G. D., 281, 351.
Buell, M. F., 220.

Buhs, R. P., 268.
Bull, H., 72.
Bull, S., 606, 718.
Bull, W. C., 153.
Bullard, J. F., 361.
Bullock, J. F., 63.
Bunce, A. C., 740.
Bunn, R. W., 345.
Burdette, R. F., 389
Burdick, R. T., 406.
Burgess, P. S., 508.
Burke, A. D., 112.
Burke, H. E., 92.
Burke, R. T. A., 170.
Burkhart, B. A., 151.
Burkhart, L., 402.
Burkholder, P. R., 294, 641, 769.
Burkitt, W. H., 512.
Burkland, E. R., 679.
Burky, C. R., 256.
Burlison, W. L, 307, 440, 660.
Burns, G. P., 680.
Burr, G. O, 276, 755, 760.
Burr, H. S., 658.
Burr, W. W., 779.
Burrell, A. B., 68.
Burress, R. M., 300.
Burrows, F. W., 192.
Burton, E. F., 2.
Burton, G. W., 196, 439, 442, 535.
Burton, M. G., 557.
Burtt, E. T., 577.
Busbey, R. L., 561, 712.
Bushnell, F. R., 118, 591.
Bushnell, J., 208, 209.
Busvine, J. R., 92, 465.
Butz, E. L., 747.
Butz, L. W., 275, 276.
Byer, E. G., 747.
Byerly, T. C., 583.
Byers, J. H., 247.
Bynum, E. K., 466.
Byrom, M. H., 257.
Bywaters, J. H., 200.

Cable, R. M., 706.
Caesar, L., 91.
Cahill, E., 6.
Cain, C. K., 480.
Cain, J. C., 68, 695.
Cain, R. L., 220.
Cain, S. A., 293.
Cairns, G. M, 619.
Cairns, J. M., 200.
Cajori, F. A., 134.
Cake, E. W., 742.
Caldwell, E. C., 270.
Caldwell, J., 329, 701.
Caldwell, M. J., 1.
Caldwell, O. G., 409.
Caldwell, P., 160.
Calhoun, M. L., 528.
Calvery, H. O., 253.
Camburn, O. M., 468.
Cameron, E. J., 262.
Cameron, F. K., 153, 157, 662.
Cameron, H. C., 620.
Cameron, H. S., 117, 366.
Cameron, T. W. M., 463.
Caminha Filho, A., 692.
Campau, E. J., 571.
Campbell, H., 23
Campbell, I. L., 435.
Campbell, J. A., 204.
Campbell, J. B., 204.
Campbell, J. C., 62
Campbell, J. D., 382, 642.
Campbell, M. M., 253.
Campbell, R. S., 423.
Campbell, T., 424.
Campbell, W. A., 74.
Campos, J. S., 298.
Cañizo, J. DeL., 703.
Cannon, C. Y., 355.
Cannon, M. D., 103.
Cannon, M. F., 601.
Card, C. G., 583, 605.
Card, L. E., 305.
Cardinell, H. A., 668.
Cardozo, M, 127.
Cardwell, A. B., 25.
Cardwell, D. W., 706.
Carlsen, E. W., 123.
Carlson, R. E, 22.
Carns, H., 699.
Carpenter, C. C., 641.
Carpenter, C. D., 724.
Carpenter, D. C., 154, 275.
Carpenter, L. E., 514.
Carr, R. B., 438.
Carr, R. E., 610.
Carr, R. H., 407.
Carrera, C. J. M., 694.
Carrick, C. W., 244, 352, 580.
Carroll, G., 423.
Carroll, G. H., 34.
Carroll, J. C., 535, 658.
Carruth, L. A., 572.
Carson, G. P., 196.
Carter, A. S., 290.
Carter, L. C., 55.
Carter, S. W., 337.
Carter, W., 224.
Carter, W. B., 93.
Cartter, J. L., 664.
Cartwright, G. E., 591.
Carver, J. S., 244, 473.
Casals, J., 252, 587.
Case, H. C. M., 381.
Casey, J. E., 55.
Casida, L. E., 44, 50, 529.
Caskey, C. D., Jr., 581.
Cassil, C. C., 565.
Castell, C. H., 476.
Cathcart, C. S., 31, 92, 102, 214.
Cathcart, W. H., 263.
Cation, D., 87, 217.
Caulfield, W. J., 475.
Cecil, S. R., 24, 607, 608, 609.
Chace, E. M., 263.
Challinor, S. W., 361.
Chamberlin, R. V., 100.
Chamberlin, V. D., 107, 121, 259, 352, 380.
Chandler, F. B., 70, 619.
Chandler, R. F., Jr., 546.
Chandler, W. H., 780.
Chang, P. C., 518.
Chang, S C., 658.
Chapin, W. E., 663.
Chapman, H. D., 88, 416, 677, 699.
Chapman, J. E., 632.
Chapman, P. J., 566.
Chapman, W. H., 54.
Charkey, L. W., 2.
Charles, E., 753.
Charles, T. B., 722.
Charpentier, L J, 466.
Chatfield, C., 765
Chattin, J. E, 592
Cheadle, V. I., 193, 651.
Chen, T.-T., 287.
Chepil, W. S., 176, 416.
Cherrington, V. A., 589
Cherry, W. B., 251, 407.
Chesnutt, S. L., 722.
Chester, K. S., 227.
Chevalier, G., 269.
Childs, E. C., 171.
Chilton, S. J. P., 41, 324, 683, 686.
Chopra, R. N., 467.
Chorin, M, 558.
Christen, J. E., 58.
Christensen, B. E., 282, 724.
Christensen, C. L., 620.
Christensen, C. M., 142, 236.
Christensen, F. W., 401.
Christensen, J. F., 484.
Christensen, J. J., 78, 551.
Christensen, R. P., 739.
Christiansen, J. E., 487.
Christman, A. A, 137.
Christopher, E. P., 68.
Christopher R. C., 723.
Chucka, J. A., 209, 619.
Chupp, C., 682, 702.
Church, J. E., 289.
Clandinin, D R., 108.
Clapp, A. L., 205.
Clapp, L. E., 178.
Clarenbach, F. A., 381.
Clark, C. A., 337.
Clark, C. F., 727.
Clark, F. J., 40.
Clark, H. E., 677.
Clark, J. A., 212.
Clark, J. H., 604, 762.
Clark, K. G., 62, 183.
Clark, L. K., 98.
Clark, N., 101, 269, 617.
Clark, N. G., 499.
Clark, W. G., 166.
Clarke, A. E., 208.
Clarke, J. F. G., 238.
Clarke, J. L., 388.
Clarke, S. E., 204, 536.

Clay, E. I., 648.
Claydon, T. J., 585.
Clayton, B. S., 178.
Clayton, C. N., 322, 455, 542.
Clayton, E. E., 229.
Clayton, H. H., 517.
Clayton, M. M., 264, 404.
Clements, H. F., 63.
Clemmer, C. W., 81.
Clifford, P. A., 253.
Clifton, C. E., 640.
Clore, W. J., 214, 217.
Clough, M. A., 600.
Clouse, R. C., 769.
Clute, W. N., 523, 685.
Clyde, A. W., 374.
Clyde, G. D., 289.
Cobb, V. C., 433.
Cobbett, N. G., 365, 590.
Coburn, D. R., 704.
Cochran, D. M., 336.
Cochran, H. L., 215.
Cochran, W. G., 533.
Cochrane, W. W., 598.
Cockerham, G., 688, 689.
Cockerham, K. L., 706.
Cockerill, P. W., 260.
Cockrum, H. G., 378.
Coco, G. L., 607.
Coco, L. C., 264.
Coe, D. M., 694.
Coffman, F. A., 60.
Cohen, B., 290.
Cohen, I. B., 602.
Cohn, G., 411.
Coke, J., 381.
Colby, A. S., 674, 681.
Cole, C. L., 106.
Cole, H. H., 203, 579.
Cole, L. J., 434.
Cole, W. C., 248.
Coleman, O. H., 89.
Coleman, R., 51, 180, 439.
Colhoun, J., 553, 688.
Collier, H. B., 586.
Collier, T. R., 646.
Collins, C. W., 557.
Collins, D. L., 466.
Collins, E. R., 418.
Collins, E. V., 350.
Colvard, D. W., 54.
Colwell, W. E., 418.
Comar, C. L., 161, 618.
Combs, W. B., 584.
Commoner, B., 188.
Compere, H., 464.
Comstock, R. E., 198, 302.
Concepcion, I., 756.
Condit, I. J., 556.
Condliffe, J. B., 739.
Conn, H. J., 31.
Conn, J. E., 285, 687.
Conners, I. L., 548, 681, 702.
Conover, R. A., 292.
Conrad, C. M., 300.
Conrad, J. P., 26.
Conrad, V., 166.
Conrat, H. Fraenkel-, 201, 532, 755.
Conrey, G. W., 632.
Contreras Arias, A., 167, 288.
Converse, C. D., 36.
Cook, A. H., 119.
Cook, C. W., 661.
Cook, H. A., 515.
Cook, H. L., 661.
Cook, H. T., 82.
Cook, R., 50.
Cook, W. C., 710.
Cooke, W. B., 74.
Cooley, J. S., 87, 696.
Cooley, R. A., 346, 482.
Coons, G. H., 211.
Cooper, D. C., 654.
Cooper, H. P., 616.
Cooper, J. R., 215, 445.
Cooper, M. R., 385.
Cooperman, J. M., 348.
Copeland, C., 91.
Copeland, J. T., 488.
Copeland, O. L., 521.
Coppen, F. M. V., 111.
Corbett, R. B., 509, 619.
Cordner, H. B., 539, 540.
Corley, R. T, 585.
Cory, E N., 95, 571, 711.
Cosby, H. E., 379.
Cossmann, K. F., 526.
Cottam, H. R., 751.
Cotterell, G. S., 699.
Cotton, C., 724.
Cotton, R. H., 180.
Cotton, R. T., 337, 565.
Cotton, W. P., 125.
Coulson, E. J., 16.
Coulthard, C. E., 186.
Council, J. C., 262.
Covington, H. M., 212.
Cowan, I. M., 575.
Cowan, J. C., 155.
Cowan, J. R., 195.
Cowden, T. K., 125.
Cowdry, E. V., 296, 335.
Cowgill, C. R., 756.
Cowie, G. A., 825.
Cowles, E. J., 3.
Cowlin, R. W., 220.
Cowsert, W. C., 116.
Cox, C. E., 231.
Cox, J. A., 237.
Cox, T. R., 53.
Crafts, A. S., 193, 430.
Craig, G. H., 260, 381, 511, 739.
Craighead, F. C., 339.
Cralley, E. M., 664.
Crampton, E. W., 472.
Crandall, B. H., 51.
Crandall, B. S., 319.
Crane, H. L., 218.
Crane, M. B., 216.
Creager, D. B., 89, 700.
Creek, C. R., 598, 658.
Creighton, J. T., 92, 710.
Cressman, A. W., 465, 570, 712
Crim, R. F., 58.
Crisler, O. S., 485.
Crist, J. W., 36, 271.
Crocker, W., 296.
Crockett, S. P., 57.
Crofton, H. D., 483.
Croker, D. M., 292.
Crombie, A. C., 338.
Cromwell, B. T., 231.
Cromwell, H. W., 624.
Crooks, G. C., 468.
Crooks, H. M., Jr., 277.
Crosier, W., 693.
Cross, G. L., 193.
Cross, W. E., 553.
Crossley, E. L., 110.
Crouch, I., 132.
Crowdy, S. H., 88.
Crowe, H. W., 774.
Crowell, H. H., 573.
Crowell, I. H., 77.
Crowther, F., 708.
Cruess, W. V., 147, 157, 263, 396, 604, 763.
Cruickshank, D. H., 297.
Culbertson, C. C., 350.
Culbertson, J. T., 251, 477.
Cullinan, F. P., 28, 215.
Cullison, A. E., 471.
Culpepper, C. W., 214.
Cumley, R. W., 47, 198, 431, 435, 520.
Cummings, K., 218, 557.
Cummings, R. W., 184.
Cummins, G. B., 186, 450, 639.
Cuneo, F., 699.
Cunningham, C. H., 372.
Cunningham, L., 116.
Curnen, E. C., 587.
Curran, H. R., 636.
Curtis, H., 259.
Curtis, J. D., 619.
Curtis, J. T., 294, 426.
Curtis, P. B., 160.
Curtiss, W. M., 381, 385.
Cushing, E. C., 98.
Cushing, R. L., 441.
Cushman, E. M., 766.
Cutler, G. H., 516.
Cutright, C. R., 97, 339.
Czarowitz, P. H., 597.

Da Costa Neto, J. P., 549.
Dack, G. M., 764.
Dahlberg, A. C., 110, 111, 408.
Dahle, C. D., 358.
Daigh, F. C., 241.
Dailey, D. L., 198, 302.
Daines, R. H., 327, 457, 542, 692.
Dakin, H. D., 148.
Daley, C. J., 198.
Dalmat, H. T., 99.
Dambach, C. A., 100.
Daniel, E. P., 513, 769.

Danielli, J. F., 284.
Danneel, R., 528.
Darley, E. F., 236.
Darling, H. M., 207.
Darling, H. S., 94.
Darling, R. C., 771.
Darrow, G. M., 654.
Darrow, R. A., 645.
Daubenmire, R. F., 422.
Davidson, J., 90, 407.
Davidson, J. A., 583.
Davidson, R. D., 734.
Davies, P. G., 574.
Davies, T. J., 386.
Davies, V., 752.
Davis, A. C., 91.
Davis, B. H., 319.
Davis, B. L., 156, 159.
Davis, C. H., 444.
Davis, D. E., 203.
Davis, G. E., 482, 587.
Davis, G. K., 106, 164, 350, 591.
Davis, H. A., 369.
Davis, H. J., 107, 135, 264.
Davis, H. P., 436.
Davis, H. T., 559.
Davis, J. F., 537.
Davis, L. R., 363.
Davis, M. B., 263, 698.
Davis, R. E., 117.
Davis, S. G., 603, 763.
Davis, W. B., 162.
Davison, V. E., 462.
Dawson, E. R., 624.
Dawson, O. L., 495.
Dawson, R. F., 679.
Dawson, W. M., 720.
Day, B. B., 461.
Day, D., 187.
Day, P. R., 173.
Dean, F. P., 565.
Dean, G. A., 91, 407, 565.
Dean, H. A., 339.
Dean, L. A., 30.
Dean, R. W., 241.
Dearden, D. V., 111.
Dearing, C., 133.
Dearstyne, R. S., 486.
DeBaun, R., 633, 732.
Decker, S. W., 312.
DeEds, F., 115, 563.
Deephouse, L., 618.
Deering, A. L., 619.
DeFelice, D., 263.
DeFrance, J. A., 64.
Degarmo, W. R., 336.
de Gruchy, J., 237.
de Gryse, J. J., 339.
Dekle, G. W., 710.
Delabarre, C. F., 706.
Delbrück, M., 684.
Del Cañizo, J., 703.
Delisle, A. L., 72.
Delisle, R., 566.
Delong, D. M., 337.
Delwiche, E. J., 311.
Demeritt, D. B., 619.
Dempster, W. T., 286.
Denning, D. G., 569.
Denny, F. E., 640, 647, 648, 690.
de Ong, E. R., 563.
Deonier, C. C., 343.
Derick, R. A., 61.
Dermer, O. C., 160.
Dermer, V. H., 160.
Deromedi, F., 291.
Descartes, S. L., 129.
DeSellem, F. E., 694.
Deshpande, R. S., 693.
DeTurk, E. E., 29.
Detwiler, S. B., 219.
Deuber, C. G., 147.
Deuel, H. J., Jr., 755, 759.
De Vall, W. B., 293.
DeVault, S. H., 384, 385, 386, 590, 596.
Devries, L., 369.
Dewey, A. W., 714.
Dewey, L. H., 535.
Dewey, V. C., 185.
Dexter, S. T., 66, 535.
Deyoe, G. P., 754.
deZeeuw, D. J., 292.
Diachun, S., 229, 552.
Díaz Pacheco, S., 387, 496.
Dicke, R. J., 564.
Dickey, R. D., 678, 700.
Dickins, D., 268, 510.
Dickman, S. R., 521.
Dickson, A. D., 23, 151, 165.
Dickson, J. G., 23, 151.
Dickson, J. R., 235.
Dickson, R. C., 238.
Dickson, R. E., 243.
Diebold, P., 495.
Dietz, C. F., 190.
Dikmans, G., 366, 369, 485.
Dillman, A. C., 168.
Dillon, R. T., 148.
Dillon Weston, W. A. R., 329, 687.
Dimick, K. P., 282.
Dimock, A. W., 223, 233, 334, 557.
Dimock, W. W., 234.
Dimond, A. E., 685.
Dinaburg, A. G., 101.
Ditman, J. A., 241.
Ditman, L. P., 237, 561, 711.
Dittemore, P. L., 407.
Dittman, A. L., 210.
Divine, J. P., 134.
Dix, I. W., 677.
Dixon, H. B., 7.
Dmytryk, M., 433.
Doan, F. J., 247.
Dobbs, C. G., 76.
Dobie, J. B., 259, 763.
Dobroscky, I. D., 562.
Dodd, A. P., 96.
Dodd, J. D., 422.
Dodds, K. S., 527.
Dodds, M. L., 268.
Dodge, B. O., 700.
Doermann, M. C., 760, 761, 764.
Doidge, E. M., 639.
Doisy, E. A., 480.
Doll, E. R., 408, 727.
Doll, R. J., 259.
Domingo, C. E., 631.
Domingo, W. E., 60.
Dominick, C. B., 337.
Demm, L. V., 203.
Donald, C. M., 54.
Doncaster, J. P., 680.
Doneen, L. D., 666.
Donelson, E. G., 767.
Donohoe, H. C., 561, 565.
Doob, H., Jr., 157.
Dooley, W. H., 615.
Doolittle, S. P., 555.
Doran, C. W., 349.
Doran, W. L., 453.
Dorland, R., 641.
Dorman, C., 31, 51.
Dorn, F. L., 111.
Doten, S. B., 269.
Doty D. M., 205, 290.
Doudoroff, M., 185.
Dougherty, J. E., 379.
Dougherty, R. W., 724.
Doughty, J. L., 206.
Douglas, H. C., 515.
Douglas, J. R., 361.
Douglass, A. E., 627.
Dove, W. F., 652.
Dowell, A. A., 741.
Down, E. E., 57.
Downing, J. C., 262.
Downs, A. A., 317, 546, 680.
Downs, C. M., 115.
Downs, W. G., 412.
Dowson, W. J., 319.
Doyle, L. P., 119, 729.
Doyle, T. M., 362.
Dozier, H. L., 369.
Drain, B. D., 445, 674, 675.
Drake, C. J., 707.
Drechsler, C., 76, 77, 222, 230, 450, 551.
Dressel, P. L., 374.
Drew, W. B., 660.
Drewes, H., 445.
Driggers, B. F., 569.
Drosdoff, M., 162, 678, 700.
Dubnoff, J. W., 755.
DuBuy, H. G., 549, 684.
Dudley, F. L., 631.
Dudley, H. C., 563.
Duerden, H., 330.
Dufrenoy, J., 34, 646, 701.
Dugas, A. L., 572.
Duggar, B. M., 523, 649, 682.
Duisberg, P. C., 393.
Duley, F. L., 170.
DuMond, C. C., 739.
Dunbar, C. O., 314.
Duncan, O. D., 752.

Duncan, R. E., 426.
Dunegan, J. C., 74.
Dungan, G. H., 299.
Dunkelberg, G. H., 211.
Dunker, C. F., 12.
Dunlay, G. L., 589.
Dunn, H. O., 49, 356.
Dunn, L. C., 433, 528.
Dunn, S., 281.
du Plessis, C., 97.
DuPree, W. E., 263, 605.
Duran-Reynals, F., 731.
Durant, A. J., 120, 730.
Dury, A., 528, 531.
Dusenbery, E. D., 482.
Dustan, A. G., 91.
Dustman, R. B., 669.
Duston, G. G., 573.
du Toit, R., 346.
Dutton, H. J., 649.
Du Vigneaud, V., 503.
Dyar, E., 502.
Dye, M., 137.
Dyer, A. J., 470.
Dykstra, P. H., 396.
Dykstra, T. P., 81.

Eadie, W. R., 89.
Eads, R. B., 562.
Eagleson, C., 568.
Eames, A. E., 292.
Easley, G. T., 49.
Easter, S. S., 345.
Eastlick, H. L., 532.
Eastman, E. R., 739.
Eastman, M. G., 405.
Eastoe, R., 198.
Eaton, O. N., 50, 433, 530.
Ebbs, J. C., 770.
Eckert, P. S., 746.
Eckles, C. H., 584.
Eckstein, A., 381.
Eddins, A. H., 455, 681.
Eddy, G. W., 99, 101.
Edgar, S. A., 119.
Edgerton, C. W., 82.
Edgerton, E. R., 89.
Edick, G. L., 379.
Edlefsen, N. E., 35, 631.
Edmond, J. B., 211.
Edmundson, W. C., 62, 207, 307, 326.
Edwards, A. D., 597.
Edwards, P. R., 250, 251, 360.
Efferson, J. N., 738.
Egaña, E., 771.
Eggers, E. R., 217.
Eheart, M. S., 506.
Ehrlich, J. 235, 334, 558.
Eichel, B., 190.
Eide, P. M., 561.
Eidt, C. C., 263.
Einarsen, A. S., 335.
Eisenhart, C., 636.
Eisenhower, M. S., 143, 765.
Eisenmenger, W. S., 632.
Ekblaw, W. E., 289.
Eke, P. A., 599.
Elder, C., 485.
Elder, W. H., 47.
Eldredge, I. F., 680, 681.
Eldredge, J. C., 539.
Eldridge, F., 43, 301.
Elgabaly, M. M., 174, 635.
Elgart, S., 254.
Elijah, H. D., 436.
Ellenberger, H. B., 468, 723.
Ellenwood, C. W., 68, 312, 313, 672.
Ellett, C. W., 324.
Ellett, W. B., 272.
Elliott, F. F., 381.
Elliott, I., 48.
Ellis, G. H., 668.
Ellis, H. R., 290.
Ellis, N. K., 208.
Elmendorf, J. E., Jr., 98.
Elmore, K. L., 182.
Elrod, R. P., 222.
Elsdon, G. D., 723.
Elson, J., 179, 183.
Elsworth, R. H., 598, 747.
Elton, C., 336.
Elvehjem, C. A., 103, 106, 107, 348, 469, 504, 505, 579, 580, 582, 612, 758.
Elving, P. J., 6.
Elwell, J. A., 632.
Ely, R. E., 437.
Elze, D. L., 555.
Emelianoff, I. V., 127.
Emerson, G. A., 504.
Emerson, R., 298.
Emlen, J. T., Jr., 101.
Emmel, M. W., 254.
Emmert, E. M., 7, 238.
Enders, R. K., 50, 51.
Engel, R. W., 361, 528.
Engene, S. A., 382.
Englis, D. T., 156.
English, H., 231.
Ensminger, M. E., 301.
Enzie, J. V., 660.
Enzie, W. D., 666.
Erb, R. E., 46.
Erekson, J. A., 142.
Erickson, E. L., 66.
Erlanson, C. O., 219.
Errington, P. L., 705.
Ertel, H., 627.
Erwin, A. T., 40, 338.
Esau, K., 193, 300, 651.
Escudero, P. A., 393.
Eskey, C. R., 588.
Esplin, A. C., 126, 432.
Esselen, W. B., Jr., 12, 603, 763.
Essig, E. O., 338.
Esteva, C., Jr., 64.
Etchells, J. L., 396, 610.
Etheridge, W. C., 534.
Evans, A. W., 231.
Evans, C. D., 153.
Evans, F. C., 361, 559.
Evans, H. M., 47, 103, 158, 201, 203, 277, 532.
Evans, J. A., 339.
Evans, J. S., 45, 50.
Evans, J. W., 96.
Evans, R. E., 347, 350.
Evans, R. I., 523.
Evans, R. J., 108, 354, 473.
Evans, W. M., 115.
Eveleth, D. F., 364, 371.
Evenden, J. C., 95.
Everett, F., 336.
Everett, N. B., 50.
Evers, C. F., 133.
Ewalt, H. P., 247.
Ewing, H. E., 100.
Ewing, P. V., 721.
Eyer, J. R., 466.
Eyles, D. E., 99, 562, 575.
Eyster, H. C., 188, 296.
Ezekiel, W. N., 74, 630.

Fabian, F. W., 761.
Fabra Ribas, A., 749.
Fahey, J. E., 342, 561.
Fairhall, L. T., 707.
Falconer, J. I., 127, 128, 736, 740, 746, 749, 779.
Farley, F. F., 152.
Farner, D. S., 583, 723.
Farnsworth, H. C., 122, 261, 600.
Farnsworth, R. B., 62.
Farr, M. M., 592.
Farr, R. H., 388.
Farrah, G. H., 23.
Farrar, M. D., 92.
Farrell, F. D., 143.
Farrell, M. A., 665.
Farrow, R. C., 25.
Faulder, E. T., 724.
Faust, G. T., 174.
Fawcett, K. I., 741.
Feeney, R. E., 279.
Fein, M. L., 409.
Feldman, A. W., 292.
Fellers, C. R., 12, 582.
Fellows, I. F., 388.
Felt, E. P., 561.
Fennah, R. G., 563.
Fenske, L. J., 124, 388, 599, 738.
Fenstermacher, R., 371.
Fenton, F., 403.
Fenwick, D. W., 703.
Fergus, E. N., 55.
Ferguson, W. S., 347.
Fergusson, S. P., 288.
Fernandez, R., 381.
Ferri, M. G., 643.
Ferris, E. B., 51, 57, 410.
Ferris, G. E., 749.
Fetzer, W. R., 9.
Fick, H. A., 578.
Field, H., Jr., 267.
Field, J. B., 114.
Fielder, V. B., 780.

Fless, H. A., 156.
Fife, J. M., 33, 520.
Fife, L. C., 706.
Filmer, R. S., 562.
Finerty, J. C., 47.
Fink, D. S., 306.
Finlayson, M. H., 636.
Finley, R. R., 632.
Finn, S. R., 726.
Fischer, H. E., 654.
Fischthal, J. H., 251.
Fisher, C. D., 604.
Fisher, C. H., 409.
Fisher, D. V., 695.
Fisher, E., 310.
Fisher, I., 638.
Fisher, P. J., 285.
Fisher, P. L., 157.
Fisher, S. W., 719.
Fishman, M. M., 191.
Fiske, J. G., 66.
Fister, L. A., 675.
Fitch, J. B., 43, 431.
Fitch, L. W. N., 254.
Fitzgerald, N. E., 272.
Flanagan, D., 112.
Flanders, S. E., 99, 100, 570, 706.
Fleck, E. E., 156.
Fleming, W. E., 565.
Flemion, F., 191.
Fletcher, J. E., 413.
Fletcher, L. J., 255.
Flint, L. H., 429.
Flint, W. P., 92, 407, 543.
Flor, C. F., 700.
Flor. H. H., 325, 455.
Flora, S. D., 25.
Floyd, E. H., 711.
Fogel, S., 188, 652.
Foggie, A., 484.
Follis, R. H., Jr., 591.
Folsom, D., 81.
Fontaine, T. D., 153.
Forbes, E. B., 718.
Forbes, I. L., 553.
Forbes, J. C., 361.
Forbes, W. H., 771.
Ford, E. S., 70.
Ford, Z. W., Jr., 399, 504.
Forgacs, J., 607.
Forrest, J. S., 288.
Forsberg, J. L., 330.
Forster, G. W., 381, 596.
Forsyth, D. D., 455.
Forsyth, F. H., 750.
Foss, C. E., 622.
Foss, J. O., 116, 510.
Fossum, M. T., 234.
Foster, A. O., 484.
Foster, A. S., 193.
Foster, C., 136.
Foster, H. H., 74, 329.
Foster, J. E., 104, 483.
Foster, J. F., 282.
Foulger, J. H., 766.
Fountaine, F. C., 589.
Fourment, 186.
Fourt, D. L., 589.
Fouts, E. L., 476, 477.
Fox, H., 340.
Fraenkel-Conrat, H., 201, 532, 755.
Frakes, M. G., 56.
Frame, B. H., 598.
Francis, C., 739.
Francis, E., 482.
Francis, G. M., 748.
Francis, J., 587.
Francisco, A., 286.
Franck, J., 526.
Frandsen, W. R., 306.
Frank, A. H., 656.
Franklin, A. H., 197.
Franklin, M. T., 703.
Fraps, G. S., 9, 31, 40, 246.
Fraps, R. M., 48, 201, 528.
Frazier, J. C., 194.
Frazier, N. W., 698.
Frazier, W. A., 445.
Frazier, W. C., 357.
Frear, D. E. H., 566.
Fred, E. B., 620.
Frederick, L. D., 361.
Fredine, C. G., 270.
Free, A. H., 400.
Freeland, R. O., 429.
Freeman, A. F., 155.
Freeman, E. M., 271.
Freeman, R. C., 132.
Freeman, S., 266.
Freeman, T. R., 476.
Freeman, V. A., 350, 591.
Freeman, W. H., 57.
Freitag, J. H., 698.
French, A. P., 314.
French, D., 274.
French, M. H., 718.
Friar, H., 397.
Friar, H. F., 603, 763.
Friedmann, K. J., 495.
Frischknecht, C., 610.
Fritz, J. C., 581.
Froker, R. K., 126.
Frost, D. V., 14.
Frost, N. M., 236.
Frothingham, E. H., 545.
Fryer, H. C., 301, 344.
Fudge, B. R., 232.
Fuelleman, R. F., 307, 440, 536, 660.
Fuller, F. D., 469.
Fuller, W. H., 176.
Fulmer, E. I., 622.
Fulton, J. P., 74.
Fulton, R. A., 561.
Fulton, R. W., 550.
Funk, E. M., 246, 583.

Gabbard, L. P., 122, 128.
Gabrielson, I. N., 336, 461.
Gaby, W. L., 480.
Gaffron, H., 648.
Gage, C. E., 390.
Gaines, J. C., 339.
Gaines, J. G., 229.
Gaines, R. C., 345.
Gale, R. H., 411.
Gallia, F., 481.
Galston, A. W., 290, 429.
Gammon, N., 36.
Garber, E., 195.
Garber, R. J., 41, 56.
Garcia, F., 271, 509.
Garcia A., A., 692.
Garcia-Molinari, O., 536.
Garcia, Rada, G., 681.
Gard, L. E., 536.
Gardiner, M. R., Jr., 363, 726.
Gardner, R., 174, 696.
Gardner, V. R., 219, 509, 674.
Gardner, W., 175.
Gardner, W. U., 103, 305.
Garlough, F. E., 336.
Garman, P., 562.
Garnett, W. E., 262.
Garrett, O. F., 9, 49, 166, 356, 358.
Garrett, S. D., 687.
Garrigus, W. P., 347.
Gates, F. C., 524.
Gates, F. H., 91.
Gauch, H. G., 427.
Gault, L., 635.
Gay, F. J., 100.
Gay, M. C., 497.
Gayer, K., 200.
Gaylord, F. C., 741.
Geddes, W. F., 21, 65, 150, 165, 665.
Gee, L. L., 90.
Geffner, J., 779.
Geigel, L. M., 494.
Geiger, W. B., 615.
Gelber, S., 430.
Gemmell, A. R., 690.
Gerhardt, F., 231.
Gerlaugh, P., 43.
Gerritz, H. W., 165.
Gersdorff, C. E. F., 134.
Gersdorff, W. A., 621.
Gershoy, A., 422.
Gertler, S. I., 15, 706.
Gessner, A. L., 748.
Gevorkiantz, S. R., 318.
Geyer, R. P., 758.
Ghosh, S. M., 467.
Gibson, A. L., 716.
Gibson, C. A., 248.
Gibson, K. S., 622.
Giddings, J. L., Jr., 640.
Gier, L. J., 300.
Gierke, A. G., 731.
Giese, H., 378, 492.
Gieseker, L. F., 290.
Gifford, E. M., 194.
Gilbert, C. H., 408.
Gilbert, E. M., 523.
Gilbertson, L. I., 161.
Gilbreath, J. R., 6.
Gililland, J. R., 515.

Gill, J. R., 756.
Gillespie, J. M., 513.
Gillette, J. M., 752.
Gilliam, R. N., 602.
Gilmore, L. E., 688.
Gilmore, L. O., 43.
Giltner, L. T., 252.
Ginsburg, J. M., 98, 99, 340.
Girard, J. W., 71.
Gish, C. L., 202.
Glaser, R. W., 574.
Glasgow, H., 342.
Glass, E. H., 705.
Glassman, S., 292.
Gleason, D. F., 166.
Glendening, G. E., 52.
Glick, D., 198.
Glick, D. P., 85.
Gluecksohn-Schoenheimer, S., 433.
Gobell, A. R., 463.
Goble, F. C., 119.
Goble, H. W., 707.
Godfrey, A. B., 45.
Godfrey, P., 618.
Golding, N. S., 23, 138, 248, 477.
Goldsmith, G. A., 264, 613.
Goldsworthy, M. C., 224.
Gómez, L. A., 316.
Gonce, J. E., Jr., 768.
Good, E., 100.
Good, E. S., 243.
Goodding, T. H., 170.
Goodearl, G. P., 107, 510.
Goodhart, R., 766.
Goodhue, L. D., 92, 237, 340, 567, 568.
Goodsell, O. E., 123.
Goodstein, S. S., 495.
Goodwin, M. W., 459.
Goodyear, H., 72.
Goos, C., 619.
Gorbman, A., 47.
Gordon, C. D., 303.
Gordon, H. M., 587, 589.
Gordon, S. A., 34.
Gordon, W. M., 562.
Gordon, W. R., 752.
Gore, U. R., 80.
Gorham, R. P., 91, 707.
Gorin, M. H., 15.
Gortner, R. A., 16, 22.
Goss, H., 367, 717.
Goss, H. W., 207.
Goss, R. W., 227.
Goss, W. H., 283.
Gottlieb, D., 449, 550.
Goulden, C. H., 652.
Gourley, J. H., 543, 668, 672.
Gowen, J. W., 528.
Graber, L. F., 754.
Gracewski, J. J., 304.
Graessle, O., 482.
Grafius, J. E., 662.
Graham, C., 237, 711.
Graham, E. R., 172, 297.
Graham, L. T., 619.
Graham, R., 117, 119, 364, 592, 731.
Graham, S. A., 558.
Graham, T. W., 229.
Grande, F., 765.
Grandfield, C. O., 660.
Granville, W. C., 622.
Gratz, L. O., 721.
Gray, H. E., 338.
Gray, L. W., 493.
Gray, R. B., 377.
Gray, S. G., 667.
Graybiel, A., 771.
Grayson, J. M., 706.
Greaves, J. E., 149, 156, 295, 410.
Greaves, T., 100.
Green, A. W., 751.
Green, D. D., 704.
Green, E. L., 224.
Green, P. L., 142.
Greenberg, G., 166.
Greene, H. C., 221.
Greene, L., 669.
Greene, R. E. L., 495, 596.
Greenstein, J. P., 147.
Greenwood, D. E., 270.
Gregg, L. E., 518.
Gregory, J. N., 571.
Gregory, P. H., 689.
Gregory, P. W., 43, 431.
Greisen, E. C., 282.
Greulach, V. A., 192.
Greve, E. W., 216, 670.
Griffee, F., 141.
Griffith, A. L., 703.
Griffith, R. B., 538, 552.
Griffiths, F. P., 603, 763.
Griffiths, J. T., Jr., 93, 708.
Grigsby, S. E., 262.
Grinnell, M. E., 710.
Griswold, S. B., 292.
Grizzard, A. L., 272.
Grodsinsky, L., 335.
Groh, H., 66.
Groschke, A. C., 472.
Gross, D. L., 666.
Gross, G. C., 512.
Gross, N. C., 131, 754.
Grottodden, O., 501.
Grove, C. S., Jr., 100.
Groves, A. B., 322.
Groves, J. W., 701.
Grüneberg, H., 302, 304, 528.
Gryse, J. J., de, 339.
Gubler, C. J., 149.
Guilbert, H. R., 367.
Guirard, B. M., 185.
Guiscafre Arrillaga, J., 316.
Gulick, A., 147.
Gull, P. E., 57.
Gull, P. W., 439.
Gulickson, T. W., 354.
Gunderson, H., 707.
Gunn, D. L., 241.
Gunn, R. V., 511.
Gunsalus, I. C., 18.
Gunther, F. A., 567.
Gustafson, A. F., 290.
Gustafson, F. G., 72.
Guthrie, J. E., 119.
Gutowska, M. S., 352.
Guy, R. A., 756.
Guzman Barron, E. S , 147.
Gwatkin, R., 481, 587.
Gyorgy, P., 624.

Haag, H. B., 212.
Haag, J. R., 357.
Haas, V. A., 603.
Haber, E. S., 237, 541, 542.
Habermann, R. T., 117, 484.
Hackleman, J. C., 60.
Hadary, G., 585, 768.
Haddock, D., 493.
Haddon, C. B., 662, 711, 779.
Hadley, F. B., 118.
Hadorn, C., 685.
Haendler, H. M., 6.
Haenseler, C. M., 319, 321, 693.
Hafner, F., 132.
Hagan, W. A., 358.
Hagborg, W. A. F., 77.
Hagood, M. J., 753.
Hahn, G. G., 333, 558.
Haines, W. J., 502.
Hakim, D. N., 513.
Haldane, J. B. S., 302.
Hale, E. B., 164, 350, 591.
Hale, J. K., 760.
Hale, W. S., 19.
Haley, D. E , 665.
Haley, W. E., 466.
Hall, D. C., 756.
Hall, G. O., 199.
Hall, S. A., 2, 412.
Hall, W. J., 730.
Haller, H. L., 92, 337, 463, 567.
Haller, M. H., 69, 669.
Halligan, R. D., 780.
Hallman, L. F., 759.
Halloran, H. R., 581.
Halma, F. F., 217, 677.
Halpin, R. B., 369.
Ham, W. E., 170.
Hamann, E. E., 479.
Hamann, R. R., 517.
Hamilton, A. B., 385, 387, 596
Hamilton, C. C., 576.
Hamilton, C. H., 596, 744.
Hamilton, C. L., 258.
Hamilton, C. S., 276.
Hamilton, D. G , 61.
Hamilton, D. W., 342.
Hamilton, H. G., 747.
Hamilton, J. G., 739.
Hamilton, J. M., 161, 321, 450 460, 556, 695.
Hamilton, W. J., Jr., 704.
Hamlin, J. C., 345.
Hamlin, K. E., Jr., 16.
Hamm, P., 18, 449.

Hamm, P. C., 663.
Hammar, C. H., 381.
Hammer, B. W., 111, 357, 585.
Hammer, C. H., 734.
Hammerberg, D. O., 381, 388.
Hammond, D. M., 362.
Hammond, G. H., 91, 707.
Hammonds, C., 349.
Hamner, A. L., 717.
Hampson, C. M., 738.
Hamre, C. J., 348.
Hamre, D. M., 639.
Hand, D. B., 282, 775.
Handler, P., 11.
Hankins, O. G., 104, 499.
Hankinson, C. L., 17.
Hannay, A. M., 261.
Hansberry, R., 562.
Hansen, C. J., 696.
Hansen, D., 657.
Hansen, E., 678.
Hansen, E. N., 355.
Hansen, H. N., 654.
Hansen, J. W., 562.
Hansen, N. E., 219.
Hansens, E. J., 569.
Hansing, E. D., 82.
Hanson, H. C., 438.
Hanson, N. S., 666.
Hanzlik, P. J., 564.
Haralson, F. E., 68, 217.
Hardenbergh, W. A., 98.
Hardesty, J. O., 162.
Hardin, C. M., 125, 126.
Hardin, L. J., 182.
Hardin, L. S., 381.
Harding, S. W., 177.
Hardison, J. R., 74, 227.
Hardy, D. E., 715.
Hardy, F., 169.
Hardy, J. I., 350.
Hare, W. W., 80.
Hargrave, P. D., 215.
Harlan, J. D., 310.
Harland, H. A., 23.
Harley, C. P., 164.
Harlow, W. M., 651.
Harman, S. W., 718.
Harmer, P. M., 211.
Harms, A., 281, 351.
Harmston, F. C., 99, 467, 574.
Harney, G., 512.
Harper, C., 719.
Harper, R. N., 590.
Harr, J. F., 731.
Harrar, E. S., 548.
Harrar, J. G., 455, 696.
Harrell, G. D., 381.
Harrington, C. D., 338.
Harris, D. G., 648.
Harris, H. C., 618.
Harris, H. L., 660.
Harris, L. E., 348.
Harris, L. J., 625, 626.
Harris, M., 615.
Harris, R. H., 8, 19, 20, 66, 149.
Harris, T. H., 16, 19.
Harris, W. V., 463.
Harrison, C. M., 535, 578.
Harrison, L. R., 408.
Harrold, T. J., 552.
Harrow, B., 621.
Harshaw, H. M., 102, 246.
Hart, A. G., 740.
Hart, E. B., 103, 579, 580, 758.
Hart, G. H., 203, 367, 579.
Hart, H., 229, 323, 550.
Harter, L. L., 67, 82.
Hartman, G. H., 9, 166.
Hartman, J. D., 694.
Hartsell, S. E., 586.
Hartt, C. E., 525.
Hartt, S, 137.
Hartung, W. H., 16
Hartwig, E. E., 41.
Hartwig, H. B., 307.
Hartzell, A., 190, 466, 567.
Harvey, A. L., 350.
Harvey, G. W., 336.
Harvey, R. B., 213.
Harvey, W. A., 445.
Harwood, P. D., 119.
Haseman, L., 463, 465, 467, 482, 569, 574.
Haskell, R. J., 66, 681.
Hassebrauk, K., 84.
Hassid, W. Z., 7, 8, 185.
Hastings, E., 712.
Hastings, E. G., 116.
Hastings, R. J., 233.
Hatch, M. H., 562.
Hatcher, B. W., 182, 522.
Hatfield, J. D., 584.
Hatheway, A. E., 119.
Hauck, C. W., 389, 741, 743.
Hauck, H. M., 776.
Hauck, J. F., 260.
Hauduroy, P., 421.
Hauge, S. M., 244, 352, 580.
Haugen, A. O., 89.
Hauschildt, J. D., 45, 50.
Haut, I. C., 314.
Havis, A. L., 447.
Havis, L., 314, 519.
Hawes, I. L., 710.
Hawkins, A., 62, 209, 619.
Hawkins, L. A., 91, 563.
Hawkins, R. S., 444, 508.
Hawks, J. E., 137.
Hawthorn, L. R., 666.
Hawthorne, B., 776.
Hawthorne, H. W., 130, 385.
Hayden, A., 422.
Hayden, S. S., 89.
Hayes, G. L., 25.
Hayes, H. K., 58, 205, 526, 533.
Haynes, J. L., 53, 536.
Hays, F. A., 199, 523.
Hays, M. B., 615.
Hayward, F. W., 305.
Hayward, K. J., 96, 466.
Hazel, L. N., 44, 302.
Headington, R. C., 271, 735, 736.
Headley, F. B., 42, 471.
Heald, F. D., 548.
Heath, L. M., 729.
Hebard, M., 93.
Heebink, G., 584.
Heemstra, L. C., 530.
Heggestad, H. E., 212.
Hegner, R., 461.
Hehn, E. R., 662.
Heidelberger, M., 18.
Heiman, V., 245.
Hein, M. A., 536.
Heinrich, C., 97.
Heinze, P. H., 419.
Heishman, J. O., 727.
Heisig, G. B., 412.
Heller, V. G., 352.
Hellman, N. N., 174.
Helm, C. A., 58.
Helmers, A. E., 193.
Helson, G. A. H., 94, 96.
Hemphill, P. V., 510.
Henderson, C. F., 242.
Henderson, H. C., 584.
Henderson, M. E., 112.
Henderson, M. T., 208.
Henderson, R. G., 308.
Henderson, W., 108.
Hendricks, J. W., 54.
Hendricks, R. H., 643, 646.
Hendricks, S. B., 173, 174.
Hendricks, W. A., 630.
Hendrickson, A. H., 35.
Hendrix, A. T., 491.
Hening, J. C., 620.
Henke, L. A., 348.
Henney, H. J., 268.
Henry, A. W., 225.
Henry, B. W., 682.
Hensley, H. C., 748.
Henson, L., 686.
Henze, H. R., 18.
Hepting, G. H., 235.
Herbert, L. P., 211.
Herbert, P. A., 547.
Herick, W. van, 252.
Heriot, A. D., 239.
Herman, C. M., 369.
Herman, H. A., 437.
Herrick, C. A., 119.
Herrick, J. A., 641.
Herriott, H. W., 253.
Herriott, R. M., 755.
Herrmann, L. F., 126, 387.
Hertz, R., 201.
Hervey, G. E. R., 713.
Hess, R. W., 679.
Hess, W. C., 7, 162.
Hester, J. B., 215.
Hetherington, E. V., 665.
Heuberger, J. W., 685.
Heuser, G. F., 244, 245, 351, 371.
Hewetson, F. N., 668.
Hewitt, L. F., 755.

Hewitt, W. B., 698.
Hewston, E. M., 138, 513, 769.
Hibbard, A. D., 440, 441, 446, 542.
Hibbard, C. W., 467.
Hibbert, H., 691.
Hickman, K., 755.
Hide, J. C., 28.
Higano, S., 776.
Higbee, E. C., 679.
Hightower, L. E., 124, 594.
Hignett, S. L., 249.
Hildebrand, A. A., 690.
Hildebrand, E M., 232, 332.
Hildebrand, W. H., 545.
Hill, A. G., 269.
Hill, G. R., 643, 646.
Hill, H. H., 520.
Hill, J. H., 639.
Hill, J. L, 590.
Hill, O. J., 477.
Hill, R. E., 340, 468.
Hiller, A., 148.
Hillig, F., 157, 162.
Hilmoe, R., 512.
Hilston, N. W., 780.
Hilton, J. H., 733.
Hilton, R., 132.
Hines, H. J. G., 242.
Hinkle, D. A., 271.
Hinman, E. H., 98.
Hinman, R. B., 512.
Hinshaw, W. R., 487, 593.
Hinton, H. E., 715.
Hirschhorn, E., 683.
Hissink, D. J., 289.
Hitchcock, A. E., 188.
Hitz, C. W., 314.
Hixon, R. M., 9, 152, 282, 616.
Hlynka, I., 248.
Ho, C., 180.
Hoagland, D. R., 427, 667.
Hoagland, R., 759.
Hobbs, B. C., 725.
Hobbs, C. S., 469.
Hobby, G. L., 18.
Hockensmith, R. D., 25.
Hockey, J. F., 629, 695.
Hockley, S. R., 434.
Hodgdon, A. R., 368.
Hodge, E. S., 1.
Hodges, E. M., 437.
Hodgson, R. E., 58, 198, 496.
Hodgson, R. W., 217, 780.
Hodill, W. H., 602.
Hodson, A. C., 142.
Hoegemeyer, L. C., 58.
Hoek, T., 610.
Hofer, A. W., 311, 424.
Hoffman, A. C., 381.
Hoffman, A. E., 160.
Hoffman, O. D., 137.
Hoffsommer, H., 381.
Hofmann, K., 147.
Hogan, A. G., 102, 105, 469.
Hoglund, C. R., 512.
Hohl, L. A., 18, 603.
Holcomb, C., 547.
Holdenried, R., 559.
Holdridge, L. R., 220.
Holdsworth, R. P., 95.
Hollander, W. F., 47.
Hollar, V. E., 541, 542.
Hollembeak, H. D, 205.
Hollender, H. A., 110.
Holley, W. C., 385.
Holloway, J. K., 712.
Hollowell, E. A., 55, 56, 553.
Holm, G. C., 589, 590.
Holmes, A. D., 138.
Holmes, F. J., 344.
Holmes, F. O., 554.
Holmes, J. C., 389, 738.
Holmgren, A. H., 524, 620.
Holt, R., 510.
Holton, C. S., 552, 686.
Holway, E. W. D., 450.
Homan, D. M., 480.
Honess, R. F., 236.
Hood, D. B., 268.
Hood, E. G., 248.
Hooper, F. E., 153.
Hoover, C. D., 204, 657.
Hope, J. G., 236.
Hopkins, J. C. F., 548.
Hoppe, P. E., 324, 454, 548.
Hopper, T. H., 153, 168.
Hopperstead, S. L. 237, 459.
Horaist, G., Jr., 345.
Horlacher, L. J., 349.
Horlacher, W. R., 407.
Horn, C. L., 60.
Horne, W. T., 556.
Horner, G., 761.
Horner, G. M., 289.
Horner, W. H., 659.
Horning, E. S., 284, 291.
Hornstein, L. R., 394.
Horsfall, F. L., Jr., 319.
Horsfall, J. G., 685.
Horsfall, R. B., 559.
Horsfall, W. R., 239.
Horton, D. C., 734.
Horwitt, M. K., 404.
Horwood, R. E., 589.
Hosaka, E. Y., 437.
Hosken, D., 780.
Hoskins, W. M., 563.
Hossfeld, R. L., 16.
Hosterman, W. H., 537.
Hostetler, E. H., 104, 471.
Hou, H. C., 756.
Hough, A. F., 25.
Hough, L. F., 232.
Hough, W. S., 237.
Houghland, G. V. C., 62.
Houk, H. J., 129.
Houser, J. S., 92.
Hoveland, N., 269, 617.
Howard, H. W., 7, 196.
Howard, N. F., 340.
Howe, C. B., 243.
Howe, H., 123.
Howe, J. W., 627, 629.
Howe, P. E., 102, 134, 263, 348.
Howell, C. E., 635, 729.
Howitt, B. F., 252.
Howland, A F., 337.
Howland, J E, 640.
Howland, W. E, 732.
Howlett, F. S., 67, 313.
Hu, C. K., 756.
Huang, C. H., 252, 728.
Hubbard, C. S., 238.
Huber, L. L., 143.
Huckabee, J. W., Jr., 518.
Hucker, G. J., 109, 483, 586.
Huckett, H. C., 713, 715.
Hudleson, I. F., 359, 477, 478, 479, 586.
Hudson, N. P., 366.
Hudson, R. S., 431.
Huebner, C. F., 114.
Hueper, W. C., 725.
Huff, C. G., 98.
Huffman, E. O., 182.
Huffman, R. E., 511.
Hughes, E. H, 105.
Hughes, R. C., 513.
Hulbert, L. S., 261.
Hulett, H. R., 5.
Hull, J. B., 715.
Hultz, F. S., 243.
Humbert, R. P., 173, 518.
Hummel, F. C., 137.
Hummon, O. J., 118, 591.
Humphrey, R. R., 306.
Humphreys, S., 591.
Humphreys, W. J., 413.
Humphries, E. C., 460.
Hungate, R. E., 347, 348.
Hungerford, C. W., 616.
Hunt, H., 145.
Hunt, H. R., 431.
Hunt, R. L., 131.
Hunt, T. E., 437.
Hunter, A. S., 30, 420.
Hunter, A. W. S., 698.
Hunter, H. A., 446.
Hunter, J. G., 231.
Hunziker, O. F., 496.
Hurd-Karrer, A. M., 213.
Hurst, V., 656.
Hurst, W. M., 258.
Hurt, B. R., 746.
Hurt, R. H., 463.
Hutcheon, W. L., 415.
Hutcheson, T. B., 308.
Hutchings, L. M., 479.
Hutchings, L. S., 359.
Hutchins, A. E., 142.
Hutchinson, J. C. D., 756.
Hutchison, S. B., 545.
Hutson, R., 91, 217.
Hutt, F. B., 199, 200.
Hutzel, J. M., 340.

Ibsen, H. L., 38, 43.
Iltis, H., 431.

Immer, F. R., 39, 58, 78, 142, 551.
Ingham, I. M., 443.
Ingle, L., 337.
Ingraham, A. S., 105.
Ingram, J. W., 466.
Insko, W. M., Jr., 281, 351, 353.
Ireland, C. F., 54.
Irizarry Rubio, G., 74.
Irvine, O. R., 476.
Irwin, E. S., 680.
Irwin, J. O., 756.
Irwin, M. R., 47, 351, 434, 435, 472.
Isaac, W. E., 87, 636.
Isaacs, M. L., 625.
Isaacs, T. L., 164.
Isbell, H., 10.
Isbell, H. S., 755.
Israelsen, O. W., 598.
Ivie, J. O., 643.
Ivy, A. C., 266.

Jaap, R. G., 106, 303.
Jaarsveld, A., 76.
Jack, E. L., 110.
Jackson, A. B., 658.
Jackson, J. E., 155.
Jackson, M. L., 174.
Jackson, R. S., 250.
Jacob, F. H., 689.
Jacob, H. E., 698.
Jacob, K. D., 182.
Jacob, M., 272.
Jacobs, W. C., 167.
Jacobson, H. G. M., 177.
Jacobson, W., 284.
Jacquot, H., 443.
James, H. G., 91.
James, L. H., 282.
James, W. O., 37.
Jameson, D. H., 645.
Jankiewicz, H. A., 112.
Janney, J. H., 765.
Janofsky, J., 629.
Janse, A. J. T., 572.
Jaques, H. E., 635.
Jardine, J. T., 778.
Jaynes, M. C., 122.
Jeffers, W. F., 232.
Jefferson, R. N., 461, 568, 705.
Jeffrey, F. P., 303.
Jehle, R. A., 681.
Jemison, G. M., 73.
Jenkins, A. E., 234, 333, 335, 556, 692, 702.
Jenkins, J. M., Jr., 42, 207, 542, 543.
Jenkins, L., 467.
Jenkins, M. T., 195.
Jenkins, W. A., 548.
Jennings, R. D., 390.
Jennison, M. W., 290.
Jenny, H., 174, 183, 635.
Jensen, C., 510.
Jensen, H. L., 185, 283.
Jensen, J. C., 381.
Jensen, J. H., 207.
Jensen, O. G., 401.
Jensen, V. S., 71.
Jenson, R., 620.
Jervis, G. A., 613.
Jessen, R. J., 595.
Jeter, H. L., 286.
Jobbins, D. M., 98.
Joffe, J. S., 168.
Johann, H., 324.
Johansen, S., 262.
Johnson, B. L., 196.
Johnson, C. R., 5.
Johnson, E., 718.
Johnson, E. A., 112.
Johnson, E. C., 142.
Johnson, E. H., 289.
Johnson, E. M., 83, 229, 552.
Johnson, H. A., 99, 735.
Johnson, H. V., 761.
Johnson, H. W., 457, 686.
Johnson, I. B., 406.
Johnson, I. J., 63, 194, 533.
Johnson, J., 212.
Johnson, J., Jr., 149.
Johnson, J. A., 462.
Johnson, J. A., Jr., 21.
Johnson, J. E., 502.
Johnson, L. E., 632.
Johnson, M. B., 385, 388.
Johnson, N. W., 381.
Johnson, O. R., 745.
Johnson, R. E., 771.
Johnson, S. E., 381.
Johnson, S. R., 106.
Johnson, T., 78, 652.
Johnson, W. A., 110.
Johnston, A., 408.
Johnston, C. O., 319, 541.
Johnston, H. K., 247.
Johnston, H. R., 708.
Johnston, J. P., 568.
Johnston, J. R., 74, 450, 518.
Johnston, P. E., 381.
Johnston, S., 544, 675.
Jolivette, J. P., 84, 693.
Jones, B. J., 54.
Jones, C. H., 468.
Jones, D. B., 174.
Jones, D. F., 652.
Jones, D. G., 433.
Jones, E. M., 277.
Jones, E. T., 541.
Jones, G. N., 292.
Jones, H., 639.
Jones, H. A., 254.
Jones, H. E., 270.
Jones, I. D., 396, 610.
Jones, I. R., 357.
Jones, J. H., 136, 243.
Jones, J. M., 243, 348.
Jones, L. G., 519.
Jones, L. H., 453.
Jones, L. K., 74.
Jones, L. R., 480.
Jones, L. W., 295.
Jones, M. J., 124.
Jones, M. M., 594.
Jones, R. M., 163.
Jones, S. B., 167.
Jones, S. C., 91.
Jones, S. E., 85.
Jones, T. C., 729.
Jones, T. H., 716.
Jones, T. L., 369.
Jones, W. R., 254.
Jones, W. W., 218, 270, 628.
Jordan, C. F., 724.
Jordan, P. S., 198.
Josephson, D. V., 358.
Josephson, L. M., 408.
Joshel, L. M., 275, 278.
Joshua, J. O., 485.
Joslyn, M. A., 263.
Joss, A., 386, 599.
Joy, E. C., 375.
Joyce, C. R., 101, 346.
Judd, D. B., 622.
Judkins, W. P., 143.
Jugenheimer, R. W., 205.
Jull, M. A., 246, 579.
Junnila, W. A., 121
Justice, O. L., 64.

Kadow, K. J., 237, 459.
Kagan, M., 568.
Kahlenberg, O. J., 401.
Kalbfleisch, W., 599.
Kaldor, D. R., 381.
Kammlade, W. G., 349, 536, 660.
Kanapaux, M. S., 140, 402.
Kaplan, N., 185.
Kapur, H. R., 254.
Kardos, L. T., 179.
Karling, J. S., 422.
Karlson, A. G., 117.
Karper, R. E., 62, 442.
Karrer, A. M. Hurd-, 213.
Kartman, L., 706.
Kass, J. P., 155, 276.
Kates, K. C., 347, 366.
Katz, M., 704.
Katz, S. H., 263.
Katzman, P. A., 480.
Kauffman, W. R., 117.
Kay, M. W., 94.
Kazicky, E. L., 559.
Kearns, C. W., 565.
Keating, F. E., 348.
Keeler, C. E., 433.
Keenan, R. G., 273.
Keepper, W. E., 735.
Keifer, H. H., 101.
Keilin, D., 241.
Keim, F. D., 666.
Keith, K. M., 741.
Keith, T. B., 483.
Keitt, G. W., 332, 695, 697.
Kekwick, R. A., 755.
Kelchner, W., 755.
Keller, H. R., 105.

Kellerman, K. F., 450.
Kelley, A. P., 186.
Kelley, E. G., 139.
Kelley, M. A. R., 259.
Kelley, R. B., 44, 432.
Kellogg, C. E., 704.
Kellogg, W. L., 246.
Kelly, E. E., 620.
Kelly, E. G., 562.
Kelly, J. B., 180.
Kelly, K. L., 622.
Kelly, M. D., 588.
Kelly, P. L., 475.
Kelser, R. A., 249.
Kemmerer, A. R., 14, 40, 246.
Kemp, W. B., 52, 619.
Kemper, H. E., 365.
Kempster, H. L., 103, 472.
Kempton, J. H., 35, 38.
Kendall, J. R., 746.
Kennard, D. C., 107, 121, 250, 352, 380, 779.
Kennedy, A. J., 362.
Kennedy, J. A., 290.
Keresztesy, J. C., 504.
Kern, F. D., 639.
Kern, R., 611.
Kernkamp, H. C. H., 117, 724.
Kernkamp, M. F., 195.
Kerns, K. R., 677.
Kerr, T., 662.
Kersten, H. J., 38.
Kertesz, Z. I., 280.
Keswick, R. C., 270.
Ketron, W., 686.
Kettelle, D. I., 126.
Key, K. H. L., 93.
Keyes, J., 317.
Keyworth, W. G., 330.
Kibler, H. H., 399, 578.
Kibrick, E., 103.
Kidder, E. H., 488.
Kidder, G. W., 185.
Kienholz, J. R., 74, 231.
Kies, M. W., 148, 513.
Kiesselbach, T. A., 535.
Killinger, G. B., 437.
Killough, D. T., 122.
Kincaid, C. M., 301.
King, C. G., 18.
King, C. J., 324.
King, C. W., 253.
King, D. F., 722, 723.
King, F. B., 394.
King, H. D., 45.
King, H. L., 566.
King, L. C., 277.
King, T. H., 195.
King, W. A., 354.
King, W. V., 98.
Kinney, E. J., 618.
Kinsman, G. M., 767.
Kirby, R. S., 75, 681.
Kirk, D. E., 379.
Kirk, W. G., 721.
Kirkpatrick, H. C., 228.
Kirkpatrick, H. F. W., 626.
Kirkwood, R. H., 602.
Kiser, O. M., 198.
Klaas, H., 756.
Klages, K. H. W., 629.
Klarmann, E. G., 565.
Kleiber, M., 656.
Klein, G. T., 528, 579.
Klein, H. P., 223.
Klein, J. R., 11, 139.
Kline, E. R., 158.
Kling, W., 261.
Klostermeyer, E. C., 93.
Klotz, L. J., 88, 94, 322, 333, 557.
Knapp, B. Jr., 104, 530, 65.
Knaysi, G., 421.
Kneen, E., 8, 23.
Knight, C. A., 83, 229, 280 329.
Knight, D. R., 120.
Knoche, W., 288.
Knoop, C. E., 655.
Knott, E. M., 772.
Knowles, D., 401, 501.
Knowlton, G. F., 99, 464, 467 562, 569, 576.
Knox, C. W., 45, 303.
Knox, J. H., 243.
Knudsen, L. F., 162.
Knutson, H., 575.
Kobayashi, F. F., 615.
Koblitsky, L., 565.
Koch, J. R., 165.
Koch, K., 81.
Koch, L. W., 690, 692.
Kocholaty, W., 33, 479, 480.
Koehler, B., 74, 457.
Koehnke, M., 227.
Koger, M., 306.
Kohl, W. H., 2.
Kohls, G. M., 346, 588.
Kolk, L. A., 451.
Kolodny, L., 172.
Kolthoff, I. M., 3, 411.
Komp, W. H. W., 98.
Kon, S. K., 721, 757.
Köppen, W., 413.
Korando, S., 140.
Kosin, I. L., 434, 531.
Kozlik, A., 495.
Kozlowski, T. T., 38, 448.
Kraenzel, C. F., 739.
Kramer, H. H., 58.
Kramer, P. J., 448, 679.
Krampitz, L. O., 647.
Krantz, B. A., 661.
Krantz, F. A., 207.
Kratzer, F. H., 107, 580, 581.
Krauss, W. E., 247, 757.
Kraybill, H. R., 154, 263, 278, 290, 308.
Krebs, H. A., 147.
Kreitlow, K. W., 74, 75, 551.
Kreutzer, W. A., 74, 85, 228.
Krider, J. L., 722.
Kriel, H. T., 669.
Krische, P., 289.
Krishna Ayyar, P. N., 717.
Krishna Iyengar, C. V., 35.
Kriss, M., 102.
Kroeber, J. K., 235.
Krotkov, G., 37.
Krueger, W. C., 762.
Krug, C. A., 653.
Krull, W. H., 250, 463.
Kruse, H. D., 766.
Krusekopf, H. H., 289, 417.
Kubes, V., 481.
Kuchel, R. H., 297.
Kucinski, K. J., 632.
Kuhlman, G. W., 386.
Kuhlmann, J. G., 298.
Kuhn, A. O., 52.
Kullmer, C. J., 167.
Kumlien, W. F., 391.
Kumm, H. W., 99.
Kummer, F. A., 733.
Kunkel, L. O., 319, 551.
Kunkle, L., 43.
Kupermintz, N., 636.
Kurtz, L. T., 3.
Kushner, S., 410.
Kuykendall, R., 419, 439, 633, 657.
Kuzmeski, J. W., 160.

Laanes, T., 45.
Lachance, R. O., 230.
Ladd, C. E., 509, 511.
Laemmle, G. J., 12.
LaForge, F. B., 17, 92.
LaForge, J. B., 567.
Lahr, E. L., 203.
Laing, J. A., 304.
Lamb, J., Jr., 632.
Lambert, R., 463.
Lambert, W. V., 778.
Lambrecht, G. H., 124.
Lamerson, P. G., 91, 572.
Lammerts, W. E., 217.
Lamoreux, W. F., 46, 199, 433.
Lancelot, W. H., 595.
Landauer, W., 532.
Landis, B. J., 468.
Landis, P. H., 262.
Landon, R. H., 213, 675.
Landsberg, H., 629.
Lanford, C. S., 755.
Langford, G. S., 571.
Langham, R. F., 727.
Langham, W., 52, 717.
Lantz, E. M., 774.
Lantz, H. L., 543.
Lapage, G., 367.
Lardy, H. A., 146, 530.
Large, E. C., 326.
Large, J. R., 548.
Larsen, H. C., 734.
Larsen, I. T., 56.
Larsen, L. F., 375, 490, 492
Larsen, N. P., 756.
Larson A. H., 213.
Larson, A. L., 122, 389.

Larson, C. L., 706.
Larson, N. P., 512, 706.
Larson, O. F., 750.
Larson, P. S., 212.
Laskaris, T., 76.
Laskowski, M., 148.
Latimer, H. B., 306.
Latimer, L. P., 312, 313, 315, 675.
Latta, R., 710.
Lattimer, J. E, 281.
Laude, H. H., 65.
Lauderdale, J. L. E., 91.
Laumont, P., 269.
Laurie, A., 234.
Laurie, A, 316.
Lauritzen, C. W., 170.
Law, A. G., 439.
Lawrence, R. V., 156.
Lawson, F. R., 464.
Lea, D., 549.
Lea, H. A. F., 97.
Leach, B. E., 361.
Leach, C. W., 497.
Leach, J. G., 74, 327.
Leach, L. D., 74, 691.
Leach, R., 698.
Lease, E. J., 411, 613.
Leathem, J. H., 531, 656.
LeBaron, H., 766.
Lebedeff, G. A., 214, 618, 652
LeClerg, E. L., 206, 207, 208
LeCompte, S. B., Jr., 177, 442, 443.
Ledingham, R. J., 225, 687.
Lee, A. T. M., 260.
Lee, C., 562.
Lee, C.-K., 414.
Lee, D. H. K., 242, 243.
Lee, F. A., 60.
Lee, G. A., 738.
Lee, S. B., 294.
Leech, H. B., 95.
Lehane, J. J., 632.
Lehman, S. G., 325, 454.
Leibowitz, J., 636.
Leinbach, F. H., 469.
Lemmon, P. E., 663.
Leonard, L. T., 525.
Leonard, O. A., 678.
Leonard, R. H., 669.
Leonard, S. L., 204.
Leonard, W. H., 39.
Leonards, J. R., 400.
Leonian, L. H., 187, 424.
LePage, G. A., 32, 637.
Lepard, O. L., 49.
Le Pelley, R. H., 711.
Lepkovsky, S., 107.
Lerner, I. M., 199.
Leukel, R. W., 211, 456, 553, 681.
Leukel, W. A., 143.
Leverton, R., 612.
Levi, I., 691.
Levi, W. M., 47.
Levine, M., 282, 430.
Levine, M. N., 65.
Levine, N. D., 364, 592, 731.
Levine, P. P., 119, 371.
Levitan, N. I., 166.
Levitt, J., 663.
Levy, P., 656.
Lewis, A. H., 347.
Lewis, C. M., 298.
Lewis, D., 643.
Lewis, J. C., 412.
Lewis, J. S., 776.
Lewis, M. T., 51.
Lewis, R. D., 57.
Lewis, W. R., 618.
L'Hote, H. J., 509.
Li, C. H., 158, 276, 277.
Lieberman, F. V., 345.
Liebig, G. F., Jr., 416.
Ligett, W. B., 6, 161.
Light, A., 749.
Lillevik, H. A., 16.
Lillie, F. R., 46.
Lilly, J. H., 311, 341.
Lilly, V. G., 187, 424.
Liming, F. G., 73.
Limstrom, G. A., 547.
Lin, Kung-Hsiang, 334.
Lincoln, F. B., 87, 670.
Lincoln, F. C., 336.
Lincoln, R. E., 270.
Lind, C. J., 295.
Lindegren, C. C., 294.
Lindegren, G., 294.
Lindenmayer, J. E., 372.
Linder, D. H., 701.
Lindgren, D. L., 238, 315, 338.
Lindner, R. C., 164.
Lindquist, A. W., 343.
Lindquist, H G., 110, 357.
Lindsay, D. R., 338.
Lindstrom, E. W., 652.
Lindstrom, H. V., 16.
Linebaugh, F., 594.
Lineberry, R. A., 402.
Linford, M. B., 334.
Link, K. P., 114, 686.
Linsley, E. G., 338, 562, 563, 716.
Lipman, J. G., 289.
Lipmann, F., 754.
List, G. M, 406, 706.
Little, E. L., Jr., 34, 186.
Little, H. W., 747, 748.
Litzenberger, S. C., 308, 444.
Live, I., 363, 726.
Lively, C. E., 751.
Livingston, J. E., 227, 327.
Lloyd, D., 288.
Lloyd, J. W., 407.
Lochead, D. C., 724.
Lochhead, A. G., 481.
Locke, S. B., 74.
Lo Coco, G., 607.
Lodman, W. J., 384.
Loeb, L., 45.
Loeffler, H. J., 515.
Loegering, W. Q., 78.
Loesecke, H. W. von, 158, 762.
Logan, M. A., 162.
Lohman, M. L., 703.
Lombard, P. M., 208.
Long, E M., 194.
Long, H. F., 585.
Long, J. B., 368.
Long, T. E., 501, 510.
Longsworth, L. G., 477.
Longwell, J. H., 43, 348.
Loomer, C. W., 260.
Loomis, N. H., 676.
Loomis, W. E., 27.
Loosli, J. K., 355, 663, 755.
Lord, E., 206.
Lord, F. T., 91.
Loree, R. E., 217.
Lorenz, F. W., 245.
Lott, R. V., 543.
Lotze, J. C., 118.
Louis, L., 395.
Love, K. S., 273.
Lovejoy, D. B., 619.
Lovelace, F. E., 154, 271, 275.
Lovvorn, R. L., 53, 439.
Low, J. B., 559.
Lowenberg, M. E., 136.
Lowther, C. V., 327.
Lowy, A., 153.
Lu, G. D., 756.
Lubitz, J. A., 582.
Lucas, G. B., 683.
Lucas, G. P., 264.
Lucas, H. L., 355.
Lucas, P. S., 358.
Luck, J. M., 754.
Lucker, J. T., 236.
Luckey, T. D., 580.
Ludbrook, W. V., 552.
Ludford, R. J., 284.
Ludwick, T. M., 431.
Ludwig, E. E., 5.
Luebke, B. H., 128, 383, 388.
Luebke, B. J., 388.
Lund, A. J., 281.
Lund, H. O., 338.
Lundegårdh, H., 298.
Lundgren, E. A., 323.
Lunsford, W. A., 300.
Luria, S. E., 684.
Lush, D., 592.
Lush, J. L., 42, 44.
Lush, R. H., 347.
Lutz, H. J., 703.
Lyerly, P. J., 40, 539.
Lyford, W. H., Jr., 372.
Lyle, C., 215, 463, 468, 510, 707, 779.
Lyle, E. W., 234.
Lyman, C., 30.
Lynch, C. C., 411.
Lynch, E. E., 98.
Lynch, S. J., 545.
Lyon, C. B., 668.
Lyon, T. L., 517.
Lyons, W. R., 203.

Lysenko, T., 144.
Lythgoe, H. C., 263.

Ma, R., 424, 641.
Maakestad, W. T., 127.
MacAloney, H. J., 241.
MacArthur, M., 263.
Macartney, E. L., 434.
MacDougall, M. S., 461.
MacDowell, E. C., 45.
MacFadyen, D. A., 412.
MacFarlane, D., 408.
MacGillivray, J. H., 666.
MacGregor, J. J., 381.
MacIntire, W. H., 182, 183, 420.
MacIntire, W. H., 522, 634.
Mack, D. E., 152.
Mack, G. L., 161, 460.
Mack, W. B., 180.
MacKay, M. R., 573.
Mackensen, O., 717.
Mackie, D. B., 91, 93.
Mackie, W. W., 67, 780.
Mackinney, G., 161, 298, 603, 604.
MacLaury, D. W., 353.
MacLean, M. E., 114.
MacLeod, F. L., 268.
MacLeod, J., 467.
MacMasters, M. M., 756.
MacNay, C. G., 94.
MacNevin, W. M., 6.
Macrae, T. F., 756.
Macy, H., 142, 584.
Macy, I. G., 137.
Madsen, D. E., 112, 483.
Madsen, M. A., 432.
Maehl, K. A., 414.
Magie, R. O., 330.
Magistad, O. C., 415, 427.
Magoon, C. A., 315, 675, 677.
Magruder, J. W., 319.
Magruder, R., 42, 214.
Maguire, B., 309, 620.
Mahan, J. N., 128.
Mahoney, C. H., 446.
Mahoney, J. F., 4.
Mail, G. A., 338.
Major, R. T., 770.
Malcolm, J. F., 253.
Maldonado, J. F., 726.
Mallmann, W. L., 475, 584, 725.
Mandels, G. R., 682.
Maney, T. J., 219, 543.
Mangelsdorf, P. C., 40, 51.
Mangus, A. R., 497, 743, 750
Manhart, V. C., 126, 600, 737
Manifold, C. B., 289.
Manley, R. H., 153.
Mann, L. K., 286.
Mann, T., 647.
Mannering, G. J., 103.
Manning, W. M., 649.
Manns, T. F., 229.
Mansfield, G. R., 181.
Manville, I. A., 756.
Manwell, R. D., 119.
Mapson, L. W., 626.
Marble, D. R., 46.
Marbut, C. F., 289.
Marcellus, F. N., 474.
March, R. B., 562, 565
Marcovitch, S., 468, 563.
Maré, G. S., 719.
Marengo, L. V., 692.
Marker, R. E., 277.
Markham, F. S., 366.
Markham, R., 549.
Markley, K. S., 283.
Markos, B. G., 97.
Marks, J. B., 524.
Markwood, L. N., 15.
Marlatt, A. L., 408.
Marrack, J. R., 498.
Marsden, S. J., 246.
Marsh, J. F., 128.
Marsh, J. T., 17.
Marsh, R. L., 138.
Marsh, R. S., 394.
Marshall, C. E., 409, 518.
Marshall, G. E., 706.
Marshall, H. L., 182.
Marshall, J. B., 51.
Marshall, R. E., 446, 595.
Marten, E. A., 327.
Marth, P. C., 670, 697.
Martin, E., 620.
Martin, F. E., 253.
Martin, G. J., 725.
Martin, G. W., 624.
Martin, H., 452.
Martin, J. H., 456.
Martin, W. E., 270.
Martin, W. H., 475.
Martin, W. J., 59, 195, 451.
Martin, W. P., 413.
Martin, W. R., Jr., 629.
Martineau, R., 577.
Martorell, L. F., 714.
Martyn, E. B., 319.
Marvin, H. N., 48, 201, 304.
Marx, R., 130.
Marx, W., 103.
Mary Lauretta (Sister), 165.
Mason, I. C., 619.
Mason, J. E., 735.
Mason, T. G., 644.
Massey, K. M., 588.
Massey, L. M., 234.
Massey, Z. A., 719.
Matheson, R., 98.
Matschat, C. H., 465.
Matson, H., 373.
Matterson, L. D., 579.
Matthewman, W. G., 91.
Matthews, E. D., 59.
Matthews, E. M., 308.
Matthews, H. T., 591.
Matthysse, J. G., 344.
Matzen, E. H., 126.
Maughan, O. H., 123.
Maurer, F. D., 729.
Max, H. J., 154.
Maxon, T., 249.
Maxwell, C. W. B., 91.
May, C., 557.
May, C. O., 381.
Mayer, D. T., 49, 147.
Mayer, I. D., 733.
Mayfield, H. L., 501, 505, 602, 615, 760, 775.
Mayhew, R. L., 115.
Maynard, L. A., 244, 755, 757.
Mayo, S. C., 596, 744.
Mayr, E., 89.
Mays, D. W., Jr., 52.
Mazzola, L. C., 283.
McAnally, R. A., 349.
McBirney, S. W., 376.
McBride, C. G., 741.
McBryde, F. W., 167.
McBurnie, H. V., 242.
McCall, A. G., 289.
McCall, G. L., 337.
McCalla, T. M., 170, 176, 633.
McCallum, A. W., 235.
McCallum, J. W., 109.
McCalmont, J. R., 378.
McCarter, J. R., 116.
McCarthy, J. F., 18.
McCay, C. M., 104.
McCleskey, C. S., 636, 691.
McClintock, B., 40.
McClintock, J. A., 671.
McClung, L. S., 651.
McClure, H. E., 462.
McClure, J. T., 629.
McComas, P. S., 61, 204.
McComas, W. H., Jr., 160.
McComb, A. L., 449.
McConnell, H. S., 465.
McCoy, E. E., Jr., 337.
McCracken, E., 780.
McCready, R. M., 7, 8.
McCulloch, W. F., 71, 317.
McDaniel, E. I., 563.
McDonald, C. C., 166.
McDonald, D. L., 511.
McDonald, W. P., Jr., 602.
McDougall, E. I., 756.
McDougle, H. C., 120, 730.
McDuffie, W. C., 91, 345.
McFadden, D. B., 270.
McFarlane, A. S., 755.
McGinnis, J., 245, 351, 371.
McGovran, E. R., 92.
McGregor, E. A., 346, 468.
McHargue, J. S., 1, 6, 164, 284.
McIndoo, N. E., 706.
McIntosh, J. A., 606.
McKeen, C. D., 88, 320.
McKenzie, H. L., 94.
McKenzie, M. A., 316, 681.
McKibben, E. G., 374.
McKibbin, J. M., 612.
McKinney, H. H., 230, 458.
McKinney, R. S., 155.
McLaine, L. S., 91, 707.
McLaughlin, F. A., 444.

McLean, J. G., 74, 84, 228.
McLean, R. A., 327.
McLendon, S. B., 98.
McLester, J. S., 611.
McMartin, W., 738.
McMeekin, T. L., 278.
McMillan, D. Y., 247.
McMillan, R. T., 122,
McMillen, R. W., 54.
McMillen, W. N., 52, 717.
McMullen, D. B., 112.
McNabb, W. M., 5, 6.
McNair, J. B., 293, 636.
McNally, A. G., 91.
McNally, W. D., 117.
McNamara, R. L., 497.
McNeil, E., 487, 593.
McNeill, J. M., 743, 744.
McNew, G. L., 75, 223, 319, 329, 331, 451.
McPhail, M., 715.
McPhee, H. C., 50.
McRoberts, V. F., 105.
McShan, W. H., 44, 529.
McSpadden, B. J., 202.
McVaugh, R., 422, 640.
McVeigh, I., 769.
McVicar, R. W., 139.
McVoy, E. C., 142.
McWhirter, L., 775.
McWhorter, F. P., 319.
Mead, H. W., 225, 323.
Mead, S. W., 43. 247, 431.
Meagher, G. S., 545.
Meanwell, L. J., 111.
Mebus, W. C., 496.
Mecchi, E., 580, 581.
Medler, J. T., 570.
Meek, W. E., 257.
, C. R., 56.
Mehlich, A., 175.
Mehlig, J. P., 3, 5.
Mehrhof, N. R., 580, 582.
Meier, I., 751.
Meites, J., 656.
Melchers, L. E., 82, 211.
Meldrum, G. S., 752.
Mellon, M. G., 5, 145.
Melnick, D., 11, 267.
Melnick, J. L., 574.
Melvin, R., 706.
Menotti, A. R., 627.
Menzies, J. D., 459, 696.
Merchant, C. H., 746.
Merchant, I. A., 358.
Meredith, C. H., 320, 699.
Merkle, F. G., 171, 521.
Merrill, E. D., 523.
Merrill, T. A., 271.
Merritt, P. P., 21, 22.
Mervine, E. M., 375, 376.
Messer, C. R., 91.
Metzger, H. J., 359.
Metzger, W. H., 519.
Meulen, E. Van der, 536, 538.
Meyer, B. S., 648.
Meyer, E. C., 380.
Meyer, J. R., 285, 651.
Meyer, K. H., 147.
Meyer, M. A., 656.
Meyer, R. K., 44, 201, 304, 529.
Meyers, A. L., 747.
Meyrick, E., 572.
Michael, A. C., 590.
Michaelis, M., 691.
Michaelis, R., 186.
Michelbacher, A. E., 468, 563.
Michell, J. H., 4.
Michener, H. D., 689.
Mickel, C. E., 142.
Mickey, G. H., 287.
Middleton, G. K., 54.
Middleton, J. T., 319, 322, 683, 702.
Midgley, A. R., 180.
Midgley, M. C., 164.
Milam, D. F., 766.
Milam, F. M., 175.
Milam, J., 561.
Milbrath, J. A., 319.
Milby, T. T., 354.
Miles, G. F., 83.
Miles, S. R., 205.
Millar, C. E., 517.
Miller, B. J., 531.
Miller, B. S., 23.
Miller, C. D., 395.
Miller, D. D., 23, 248.
Miller, E. C., 644.
Miller, E. E., 384.
Miller, G. L., 328.
Miller, H., 376.
Miller, H. L., 38.
Miller, J. C., 212.
Miller, J. H., 557, 639.
Miller, J. W., 707.
Miller L. B., 418.
Miller, L. I., 337.
Miller, L. P., 190.
Miller, L. W., 343.
Miller, M. F., 509.
Miller, M. H., 591.
Miller, M. R., 364.
Miller, P. R., 454.
Miller, P. W., 74, 233, 319.
Miller, R. A., 306.
Miller, R. C., 121, 393, 491.
Miller, R. F., 117, 579.
Miller, V. L., 244.
Miller, W. T., 588, 727.
Mills, E. M., 704.
Mills, H. B., 236.
Mills, P. J., 553.
Mills, R. C., 107, 579.
Mills, W. D., 340, 694.
Milner, M., 150.
Miner, M. L., 620.
Minneman, P. G., 127.
Minz, G., 557.
Mireira, S., 334.
Mirsky, A. E., 147.
Mirsky, I. A., 254.
Mitchell, H. H., 563, 756.
Mitchell, H. L., 290.
Mitchell, H. S., 263, 612.
Mitchell, J. E., 449.
Mitchell, J. H., 613.
Mitchell, J. H., Jr., 278.
Mitchell, J. W., 67.
Mixner, J. P., 199.
Mizroch, J., 2.
Moats, R. W., 744.
Moberg, T. R., 270.
Moe, E. O., 498.
Mohan, B. N., 592.
Mohler, J. R., 367, 369, 482, 724.
Mohr, J. L., 287.
Moinat, A. D., 427, 667.
Molestina O, E., 681.
Mönnig, H. O., 346.
Monro, H. A. U., 566, 707.
Monroe, M. M., 619.
Monson, O. W., 378, 490.
Montgomery, H. B. S., 460, 550.
Montgomery, I. W., 587.
Montgomery, J. P., 747.
Montgomery, R. C., 475.
Mooers, C. A., 269.
Mook, P. V., 92.
Moomaw, I. W., 747.
Moomaw, L. M., 289.
Moore, H. R., 735, 745, 747.
Moore, J. D., 695, 697.
Moore, J. H., 662.
Moore, J. S., 419.
Moore, M., 264.
Moore, M. D., 144.
Moore, R. C., 705.
Moore, T., 770.
Moore, W., 724.
Moore, W. C., 319.
Moore, W. D., 691.
Moorehouse, L. A., 618.
Moran, C. H., 53, 308.
Moran, T., 611.
Moravets, F. L., 220.
Morehead, L. B., 374.
Moreland, C. F., 429.
Moreno, I., 706.
Morgan, A. F., 767.
Morgan, B. B., 113, 251, 360, 463, 706.
Morgan, C. F., 203.
Morgan, I. M., 114.
Morgan, M. F., 177.
Moriguchi, S., 63.
Morison, F. L., 130, 381, 735, 736, 740, 746.
Morrill, A. W., Jr., 716.
Morrison, B. V., 616.
Morrison, B. Y., 219, 544.
Morrison, F. B., 354.
Morrison, F. O., 237, 707.
Morrison, R. W., 475.
Morrison, S. M., 586.
Morton, H. E., 286.
Morton, R. A., 13.
Moser, A. M., 612.

Moser, F., 521.
Moser, F. Y., 265.
Moss, E. G., 63.
Moss, M. L., 5, 145.
Mote, D. C., 564.
Mott, L. O., 118.
Motts, G. N., 601.
Motts, I. E., 524.
Moulton, F. R, 98, 482.
Mounce, I., 230.
Movitt, E., 759.
Moyer, D., 641.
Moyer, H. V., 2.
Moyer, J. C., 400.
Moyer, L. S., 15, 191.
Moyle, A. I., 678.
Moynihan, I. W., 481, 587.
Mrak, E. M., 397, 398, 604.
Mrazek, R., 777.
Mudd, S., 421.
Mueller, C. D., 200.
Mueller, R. A., 729.
Muenscher, W. C., 663.
Muesebeck, C. F. W., 100.
Mühle, E., 80.
Muhr, G. R., 179.
Muir, R. D., 480.
Mujica R., F., 688, 689.
Mulhern, T. D., 98.
Mull, L. E., 476, 477.
Mull, R. P., 187.
Müller, A. S., 682.
Muller, H., 166.
Muller, W. H., 188.
Muma, M. H., 571.
Mumford, D. C., 386.
Mumford, H. W., Jr., 389.
Munce, T. W., 727.
Munks, B., 137.
Munn, M. T., 307.
Munns, E. N., 449.
Munro, J. A., 463, 715.
Munro, J. W., 338.
Munro, S. S., 434, 531.
Munsell, R. I., 428.
Muntz, H. H., 548.
Murneek, A. E., 419.
Murphree, R. L., 50.
Murphy, A., 51.
Murphy, E. F., 652.
Murphy, H. C., 533.
Murphy, J. M., 49, 116, 356.
Murphy, R. M. P., 59.
Murphy, R. P., 526.
Murray, M. A., 449.
Murray, W. G., 381, 740.
Muskett, A. E., 553, 688.
Myers, A. T., 636.
Myers, C. E., 312.
Myers, H. E., 55, 173, 414.
Myers, R. M., 524.
Myers, W. I., 383, 619, 740.
Myers, W. M., 41, 56, 61, 652.
Myler, J. L. 89.

Naffziger, L. M., 289.
Nalbandov, A., 305.
Nash, E. P. H., 756.
Nash, L. B., 210.
Nash, R. W., 716.
Natal Colón, J. E., 60.
Nattrass, R. M., 685.
Nazeer Ahmed Janjua, 92
Neal, D. C., 687.
Neal, O. R., 172, 536.
Neal, P. A., 563.
Neale, P. E., 243, 719.
Neatby, K. W., 666.
Neely, J. W., 300.
Negroni, P., 638.
Neher, B. H., 48.
Neller, J. R., 178.
Nelson, F. E., 421, 475.
Nelson, H. D., 561.
Nelson, J. A., 356, 724.
Nelson, J. M., 37.
Nelson, L. B., 519.
Nelson, M., 441.
Nelson, N., 254.
Nelson, N. M, 730.
Nelson, N. T., 306.
Nelson, O. A., 275, 276.
Nelson, P., 121, 382, 494.
Nelson, R., 70, 86, 233.
Nelson, R. C., 18, 142, 159.
Nelson, R. R., 263.
Nesbit, M., 766.
Nesius, E. J., 381.
Ness, A. D., 410.
Nestler, R. B., 462.
Nettles, W. C., 562.
Neustadt, M. H., 7.
Newcomer, E. H., 654, 670.
Newcomer, E. J., 561.
Newell, T. R., 731.
Newell, W., 778.
Newhall, S. M., 622.
Newman, A. S., 176, 416.
Newman, M. S., 2.
Newton, M., 78, 652.
Nicholas, J. E., 475.
Nichols, J., 276.
Nichols, P. E., 398.
Nicholson, D. G., 155.
Nickerson, D., 513, 622.
Nielsen, E., 505, 773.
Nielsen L. W., 321.
Nightingale, G. T., 70.
Nissley, C. H., 445, 542.
Niven, C. F., Jr., 18, 274.
Noble W. B., 575.
Nobles, M K., 702.
Noggle, G. R., 187, 297.
Noguera, J. R., 496.
Nolte, A. J., 158.
Nord, F. F., 147, 187.
Norman, A. G., 176, 180, 416.
Norris, D., 455.
Norris, J. J., 578.
Norris, L. C., 245, 351, 371.
Northen, H. T., 191.
Norton, J. B. S., 482.
Nourse, D. O., 272.
Novak, C. R., 777.
Nutter, J. W., 618.
Nybroten, A. N., 123, 599.

Oakwood, T. S., 277.
Oberle, G. D., 676.
Ochoterena, I., 422.
Odland, M. L., 512.
Odland, T. E., 53, 64, 308.
Ogdon, M., 127.
Ohlrogge, A. J., 661.
O'Kelly, J. E., 51, 59, 61, 204.
Okey, R., 503.
Olcott, H. S., 153.
Olitsky, P. K., 114.
Oliver, V., 166, 628.
Olivier, L., 120.
Olliver, M., 625, 773.
Olmo, H. P., 676.
Olsen, M. W., 48, 287.
Olsen, O. W, 363.
Olson, L. C., 180.
Olson, R. V., 149.
Ong, E. R. de, 563.
Oppel, T. W., 772
Opsahl, J. C., 275.
Ordal, E. J., 291.
Organ, J. G., 775.
Orr, J. B., 498.
Orsini, D., 504.
Orton, C. R., 510.
Osborn, J. H., 334.
Oser, B. L., 263.
Osterman, E., 525.
Osterwalder, A., 696.
Otis, C. K., 379.
Otten, C. J., 681.
Overcash, J. P., 675.
Overholser, E. L, 563, 668.
Overholt, V., 374.
Overley, F. L., 563, 668.
Overman, R. S., 114.
Overstreet, R., 174.
Owen, F. V., 51.
Owens, C. E., 231, 319.

Paarlberg, D., 382.
Pace, J., 611.
Pacheco H., M., 687.
Packchanian, A., 119.
Packer, R. A., 358.
Pagel, H. A., 412.
Painter, E. P., 410.
Painter, J. H., 678.
Painter, R. H., 541.
Painter, T. S., 434.
Palafox, A. L., 245
Palkin, S., 2, 278, 412.
Palmer, C. C., 253.
Palmer, L. J., 704.
Palmer, L. S., 17.
Palmer, R. C., 695.
Palmiter, D. H., 321, 332, 460, 556, 695.
Paris, C. D., 219.
Parish, H. E., 562.
Park, B. C., 461.
Park, O. W., 338, 468.

Parker, E. R., 447.
Parker, G., 266.
Parker, J. E., 202, 351.
Parker, M. E., 263.
Parker, M. W., 649.
Parker, R. L., 91, 572.
Parker, R. R., 113, 588.
Parker-Rhodes, A. F., 452.
Parkhurst, R. T., 352, 582.
Parkin, E. A., 92.
Parks, R. Q., 184.
Parmelee, C. E., 623.
Parris, G. K., 681.
Parrish, B. D., 261.
Parrott, E. M., 352.
Parrott, P. J., 271.
Parsley, J. E., 619.
Parsons, C. H., 301.
Parsons, F. L., 748.
Parsons, H. T., 612, 760.
Parsons, K. H., 381.
Paschal, J. L., 381.
Pascoe, E., 271.
Patterson, I., 776.
Patterson, J. V., 70.
Patteson, G. W., 25.
Pattison, A., 508.
Patton, A. R., 102.
Patton, E. W., 611.
Patty, R. L., 492.
Paul, H., 104.
Paulsen, E. F., 153.
Paulsen, T., 512.
Paulson, W. E., 122.
Payne, J. E., 770.
Payne, L. F., 350, 579.
Peacock, N. D., 272.
Pearce, G. W., 566.
Pearse, A. S., 236, 237.
Pearson, G. A., 546.
Pearson, N. L., 59.
Pearson, O. P., 50, 51.
Pearson, P. B., 296, 722.
Pearson, R. W., 180, 189.
Pearson, T. G., 559.
Pechuman, L. L., 338.
Peck, O., 576.
Peck, R. H., 73, 497, 606.
Pederson, C. S., 263, 395, 760
Peebles, R. H., 527.
Peech, M., 30.
Pecle, T. C., 176.
Peet, L. J., 508.
Peirce, R. H., 122.
Pellett, F. C., 577.
Pence, R. O., 665.
Penner, L. R., 118, 467.
Pennington, M. E., 263.
Penquite, R., 352, 354.
Pepkowitz, L. P., 3.
Pepper, B. B., 502.
Pepper, J. H., 712.
Percival, G. P., 312, 421.
Perfect, D. E., 170.
Perkins, A. E., 102.
Perkins, S. O., 632.
Perlberger, J., 555.
Perlmutter, F., 654.
Perlzweig, W. A., 11, 139.
Perrault, C., 230.
Perrin, T. L., 361.
Perry, B. A., 653.
Persing, C. O, 93, 237, 340.
Pescott, R. T. M., 464.
Peters, E. J., 81.
Peters, L. A. H., 765.
Peters, R. A., 284.
Petersen, W. E., 43, 247, 431
Peterson, A., 337.
Peterson, A. W., 493, 494, 738.
Peterson, C., 395.
Peterson, C. E., 237.
Peterson, E. H., 114.
Peterson, J. B., 178, 415, 518.
Peterson, J. P., 98.
Peterson, R., 438.
Peterson, R. T., 559.
Peterson, W., 620.
Peterson, W. H., 185, 773.
Peterson, W. J., 471.
Petherbridge, F. R., 574.
Petrie, A. H. K., 646.
Pfadt, R. E., 408.
Pfaff, H. L., 57.
Pfeiffenberger, G. W., 122.
Pfeiffer, C. A., 305.
Phaff, H. J., 397, 604.
Philip, C. B., 587.
Phillips, C. A., 477.
Phillips, C. E., 118.
Phillips, G. L., 345.
Phillips, J. H. H., 554.
Phillips, P. H., 103, 146, 505, 530.
Phillips, R. E., 246.
Phillips, R. W., 104, 198, 301, 432, 530, 655.
Phillips, T. G., 368.
Phillipson, A. T., 349.
Phillis, E., 644.
Phipard, E. F., 765.
Phipps, I. F., 454.
Pickens, E. G., 361.
Pickrell, K. L., 249.
Piemeisel, R. L., 464.
Pieniazek, S. A, 544.
Pierce, E. C., 427.
Pierce, M., 254.
Pierre, W. H., 28, 183, 189.
Pierson, A. H., 318.
Pigott, M. G., 138.
Pijoan, M., 764.
Piland, J. R., 54.
Pinckard, J. A., 82, 319.
Pingrey, H. B., 737.
Pinnell, E. L., 654.
Pino, J., 303.
Pippinger, C. R., 92.
Pirie, N. W., 230.
Pitman, A. L., 604.
Pitner, J., 418, 439, 633, 657.
Pittman, M. S., 767.
Plagge, H. H., 605.
Plakidas A. G., 329.
Plambeck, H. H., 392.
Plastridge, W. N., 116, 251.
Platt, C. S., 723.
Platts, N. G., 715.
Platz, B. R., 139.
Plessis, C. du., 97.
Pletsch, D. J., 271, 562.
Plimmer, R. H. A., 262.
Plimmer, V. G., 262.
Plummer, A. P., 52.
Plummer, P. J. G., 729.
Poe, C. F., 115.
Poffenberger, P. R., 384, 386, 390, 596.
Pohle, E. M., 105, 720.
Pohle, W. D., 156.
Polk, H. D., 353, 493, 734.
Pollard, M., 730.
Polson, R. A., 740.
Pomerat, C. M., 250.
Pomerleau, R., 235.
Pomeroy, B. S., 371.
Pond, G. A., 659.
Ponting, J. D., 515.
Poos, F. W., 711.
Pope, M. N., 439, 537.
Porter, D. A., 483.
Porter, H. G., 745.
Porter, J. C., 120.
Porter, R. P., 319.
Portman, R. W., 569.
Posnette, A. F., 699.
Post, A. H, 308, 657.
Post, K., 218.
Potter, G. F., 678.
Potter, J. S., 45.
Potter, R. L., 106.
Poulson, E. N., 632.
Pounden, W. D., 655.
Powell, D., 331, 332.
Powell, E. L., 153.
Powell, E. O., 726.
Powell, J. F., 769.
Power, M. E., 574.
Powers, W. E., 413.
Prater, A. N., 3.
Pratt, A. D., 54.
Pratt, P. C., 103.
Pratt, R., 687.
Prendergast, B., 464.
Prentice, I. W., 329, 701.
Prescott, S. C., 263.
Presley, J. T., 74, 324.
Preston, J. F., 317.
Preston, R. J., Jr., 193, 546.
Price, E. W., 485.
Price, F. E., 379.
Price, W. A., 238.
Price, W. C., 453, 457.
Prince, A. L., 3.
Prince, F. M., 576.
Prince, F. S., 310, 368.
Pritchard, G. P., 756.
Proebsting, E. L., 669, 696.
Promersberger, W. J., 121, 381.
Prucha, M. J., 109, 407.

Pubols, B. H., 123, 493.
Pucher, G. W., 16, 147.
Pugh, L. H., 359.
Pugsley, A. T., 454.
Pulley, G. N., 158.
Purchase, H. S., 487.
Purdy, D. L., 132, 500.
Putnam, P., 592.
Putt, E. D., 664.
Pyenson, L., 577.
Pyke, W. E., 762.

Quackenbush, F. W., 1, 399.
Quackenbush, G. G., 124.
Quayle, H. J., 338.
Quayle, W. L., 440.
Quigley, G. D., 486.
Quinn, J. P., 45.
Quitslund, F. A., 741, 742.
Quortrup, E. R., 254.

Rabak, W., 604.
Rabstein, M. M., 724.
Rader, L. F., Jr., 179.
Radford, C. D., 242.
Radin, G., 765.
Radlove, S. B., 276.
Ragland, C. H., 68, 312.
Ragsdale, A. C., 103.
Rahn, E. M., 309, 512.
Rahn O., 636.
Raistrick, H., 186, 523.
Rake, G., 639.
Ralph, P. H., 286.
Ramasarma, G. B., 513.
Ramírez, J. H., 154.
Rammelkamp, C. H., 249, 250.
Randall, M., 4.
Randall, T. E., 214.
Randle, S. B., 160.
Randolph, J. W., 442, 495.
Rangaswami, S., 703.
Rao, S. D., 513.
Raper, A., 750.
Raper, J. R., 34.
Rapp, K. E., 164, 284.
Rasmussen, K., 198.
Rasmussen, M. P., 742.
Ratchford, W. P., 409.
Rather, H. C., 58, 583.
Rawitscher, F. K., 631, 643.
Ray, W. W., 227.
Read, P. R., 142.
Rebour, 269.
Recknagel, A. B., 73.
Record, P. R., 473.
Record, S. J., 679.
Rector, N. H., 98.
Rector, R. R., 246.
Reddick, D., 455.
Reder, R., 506.
Reece, P. C., 70.
Reece, R. P., 203.
Reed, C. H., 407.
Reed, C. L., 777.
Reed, G. N., 152.
Reed, H. J., 778.
Reed, H. M., 398.
Reed, H. S., 34, 311, 550.
Reed, J. F., 180.
Reed J. J., 381.
Reed, W. D., 563, 566.
Reeder, J. R., 186.
Rees, B. E., 344.
Rees, D. M., 239.
Reeves, R. E., 650, 651.
Regan M. M., 381.
Regan, W. M., 43, 431.
Reichel J., 727.
Reichelderfer, F. W., 289.
Reichert, I., 555.
Reid, D. G., 548.
Reid, E. E., 277.
Reid, J. J., 665.
Reid, M. E., 15.
Reid, M. G., 392, 508 740.
Reiman, S. P., 531.
Reineke, E. P., 306, 435, 529
Reinhard, H. J., 99, 574.
Reinking O. A. 271.
Reinmiller, C. F., 44, 302.
Reiser, R., 9.
Reiss, F., 57.
Reitemeier, R. F., 415.
Reithel, F. J., 480.
Reitz, H. C., 22.
Reitz, J. W., 745.
Reitz, L. P., 541.
Reitz, W. W. 417.
Renne, R. R., 271, 511.
Rennels, R. G., 89.
Renner, K. M., 248.
Rettger, L. F., 112.
Reuss, C. F., 261, 493, 745, 753.
Reuther W., 192.
Reynard, G. B., 140, 459, 482.
Reynolds, D. S., 182.
Reynolds, L. G., 381.
Reynolds R. V., 318.
Rhian, M., 244, 245, 354.
Rhoad, A. O., 301, 432, 438.
Rice T. D. 289.
Rice, V. A., 43.
Richards, A. G., Jr., 237.
Richards, B. L., 51.
Richards, L. A., 27.
Richards, M. C., 681.
Richards, O. W., 689.
Richards, S. J., 170.
Richardson, B. T., 406.
Richardson, H. H., 337, 709
Richardson, H. L., 31.
Richardson, J. E., 501, 505, 602, 615, 760, 775.
Richardson, R. W., 168.
Richey, C. B., 374, 732, 733.
Richter, J. H., 495.
Rick, C. M., 42, 650, 655.
Rickett, H. W., 635, 700.
Riddle, O., 203, 306.
Riedl, W. A., 440, 464.
Rieger, G., 160.
Riehl, H., 628.
Rieke, F. F., 648.
Rieman, W., III, 160.
Rietz, J. H., 116.
Rife, D. C., 43.
Riffenburgh, A. S., 262.
Riggs, J. K., 243.
Riker, A. J., 682.
Riley, G. M., 48, 583.
Riley, N. A., 629.
Rimington, C., 755.
Ringrose, A. T., 353.
Rinke, E. H., 58, 526.
Riollano, A., 214, 215, 230, 309.
Ripperton, J. C., 437.
Ritcher, P. O., 66.
Ritchie, W. S., 280.
Rivers, T. M., 319.
Rizzi, A. D., 676.
Roark, R. C., 92, 337, 564.
Robb, W., 534.
Robbie, W. A., 708.
Robbins, P. W., 545.
Robbins, W. J., 424, 641, 642.
Robert, A. L., 225.
Roberts, C. A., 408, 493.
Roberts, E., 137.
Roberts, E. C., 480.
Roberts, E. R., 16.
Roberts, G., 618.
Roberts, J. B., 743.
Roberts, O. C., 674.
Roberts, R. E., 244, 352, 580.
Roberts, R. H., 6[illegible]5.
Roberts, S. J., 728.
Robertson, D. W., 39, 204.
Robertson, E. I., 245.
Robertson, L., 737.
Robertson, L. S., 601.
Robertson, W., 271.
Robinow, M., 768.
Robinson, B., 183, 420.
Robinson, B. B., 60.
Robinson, C. H., 688.
Robinson, H. J., 115.
Robinson, J. L., 57, 58.
Robinson, K., 242, 243.
Robinson, R. H., 563.
Robinson, W. D., 765.
Robotka, F., 127.
Rodenhiser, H. A., 78.
Roderuck, C. E., 138.
Rodrigues, G., 169.
Roepke, M. H., 724.
Rogers, H. T., 177, 189.
Rogers, R. E., 615.
Rogler, G. A., 196.
Rogosa, M., 641.
Rohner, L. V., 163.
Rohrbaugh, P. W., 34.
Rohrmann, E., 277.
Roman, H., 652.
Romanoff, A. L., 246, 305, 433, 529.
Rook, G., 542.
Roques, 186.

Rose, C. S., 624.
Rose, D. H., 310, 556.
Rose, W. C., 502.
Rose, W. G., 155.
Roseau, 269.
Roseboom, L. E., 98.
Rosenthal, F., 154.
Ross, C. S., 173.
Ross, D. E., 407.
Ross, E. D., 754.
Ross, W. H., 162, 163, 164.
Rossby, C.-G., 166, 628.
Rossoff, M., 262.
Rost, C. O., 414, 518.
Rostenbach, R. E., 732.
Roth, E. R., 235.
Rounds, M. B., 217.
Rous, P., 319.
Rouse, H., 627, 629.
Routien, J. B., 459, 679
Rowland, S. J., 111.
Roy, D. N., 467, 468
Rubin, M., 474.
Rubins, E J., 633, 780.
Ruden, W. L., 124, 597.
Rudolf, P O., 318
Rudolfs, W., 99, 158.
Ruehle, G D., 234
Rufener, W W., 123.
Ruggles, A. G., 511.
Ruhland, H. H., 589.
Ruigh, W. L., 283.
Rundle, R. E., 274.
Rusk, H. W., 165.
Rusoff, L L., 580.
Russel, J. C., 633.
Russell, A., 275.
Russell, E. J., 289, 510.
Russell, J., 710.
Russell, M. B., 171
Russell, P. F., 99, 592.
Russell, R. C., 225, 226
Russell, W. C., 583
Ruth, W. A., 543, 544, 563.
Ryall, A. L., 669.
Ryan, B., 749, 754.
Ryan, E., 614.
Ryff, J. F., 408.
Rygg, G. L., 232.

Saarni, R. W., 592.
Sabol, M., 757.
Sabrosky, C. W., 90.
Saiki, T., 756.
Sailer, R., 256.
St. John., H., 202.
St. John, J. L., 160, 164, 354.
Sair, L., 9.
Salisbury, E. J., 423.
Salisbury, G. W., 48, 49.
Sallans, B. J., 65, 687.
Salle, A. J., 290, 523.
Salmon, W. D., 760.
Salt, R. W., 338.
Sampson, J., 117.
Samuel, C. K., 92.
Samuel, G., 689.
Samuels, J. K., 741, 743.
San Clemente, C. L., 477.
Sanborn, J. R., 109.
Sanders, E., 559.
Sanders, R. G., 371.
Sanderson, D, 392.
Sanderson, F. H., 516.
Sandhouse, G. A, 241.
Sando, L, 142.
Sandstedt, R. M., 8, 23.
Sandstrom, W. M., 281.
Santos, F. O., 756.
Santos, J. V., 292.
Sarasola, A. A., 692.
Sardar Singh Bhatia, S., 475.
Sarett, H. P., 139.
Sargent, M. C., 33.
Sarles, M. P., 365.
Sarles, W. B., 90.
Satterfield, G. H., 104.
Sauer, H. M, 391.
Sauve, E. C, 594.
Savage, E. S., 247.
Saville, D. B O., 681.
Saville, R. J., 745, 746.
Sawin, P. B., 198.
Sawyer, J. E., 115.
Sawyer, W. A., 766.
Sayers, R. R., 563.
Saylor, L W., 344.
Sayre, C. B., 309, 446.
Sayre, J. D., 36.
Scandrette, C., 391.
Scaramuzza, L. C., 97.
Scarseth, G. D., 27, 270, 661.
Schaal, L. A., 62, 307, 326.
Schaefer, G. T., 740.
Schafer, E. G., 418.
Schaible, P. J., 605.
Schaller, J. A., 380.
Schalm, O. W., 727.
Schappelle, N. A., 218.
Schatz, A, 186.
Schechter, M. S., 337, 463.
Scheel, L. D., 114.
Scheid, M. V., 584.
Scherago, M., 279.
Schick, R. D., 201.
Schickele, R., 381, 740.
Schiel, E, 186.
Schiffman, E. G., 749.
Schlesinger, R. W., 114.
Schmid, A. R., 53.
Schmidt, C. M., 645.
Schmidt, G, 755.
Schmidt, H., 722.
Schmitz, H., 120.
Schmitz, H. P., 271.
Schneider, B. A., 95.
Schneider, G. W., 311, 466.
Schneider, M. D., 113.
Schoen, P. W., 546.
Schoening, H. W., 249.
Schoenleber, L. H., 373.
Scholl, J. C., 630.
Schonken, D. B., 238.
Schott, R. G., 301, 720.
Schrenk, H. von, 120.
Schroeder, C. A., 218.
Schulman, E., 167.
Schulman, J. H., 284.
Schultz, E. S., 326.
Schultz, J. H., 668.
Schultz, T. W., 740.
Schumacher, F. X., 38, 548.
Schumacher, J. E., 145.
Schuster, C. E., 26.
Schuster, G. L., 405.
Schuster, M. L., 455.
Schwantes, A. J., 488.
Schwardt, H. H., 344, 562.
Schwarte, L. H., 358.
Schwartz, B., 724.
Schwartz, H., 381.
Schwartz, M. C., 7.
Schwartze, C. D., 23, 214, 217.
Schweiger, L. B., 364.
Schwimmer, S., 148.
Schwitzgebel, R. B., 97, 339.
Sciarini, L. J., 187.
Scott, C. E., 696.
Scott, D. H., 697.
Scott, F. M., 194.
Scott, H. H., 579.
Scott, H. M., 304.
Scott, J. P., 366.
Scott, J. W., 358.
Scott L. B., 561.
Scott, L. E., 544.
Scott, M. L., 351.
Scott, W. J., 513.
Scott Blair, G. W., 111.
Scott Watson, J. A., 101.
Scrivner, L. H., 408.
Scudi, J. V., 140, 268.
Seale, C. C., 206.
Searcy, G. L., 119, 304, 729.
Sebrell, W. H., 201, 766.
Sechrist, W. C., 497.
Seddon, H. R., 724.
Seeler, A. O., 482.
Segal, S. A., 381.
Seher, O. W., 724.
Seifriz, W., 36.
Seizert, B. F., 73.
Seliskar, C. E., 235.
Sellers, W. F., 99.
Seltzer, 269.
Semple, A. T., 536.
Senn, H. A., 429.
Serebrenick, S., 167.
Serfontein, P. J., 581.
Severin, H. H. P., 557.
Severson, A., 106, 401.
Sewell, W. E., 244.
Sewell, W. H., 601, 753.
Sexauer, E. H., 739.
Shabica, A. C., 277.
Shackelford, M., 303.
Shafer, J. I., 512.
Shaffner, C. S., 531.
Shahan, M. S., 113, 252, 482.
Shands, H. L., 23, 151.
Sharman, B. C., 526.

Sharp, D. G., 368.
Sharp, P. F., 7, 157.
Sharpless, G. R., 757.
Sharvelle, E. G., 88.
Shaw, A. O., 108, 240, 344, 471.
Shaw, B. T., 173, 184.
Shaw, H., 460, 550.
Shaw, J. C., 247.
Shaw, J. H., 505.
Shaw, J. K., 42, 669.
Shaw, J. N., 368.
Shaw, K. J., 229, 320.
Shaw, L., 218, 325.
Shaw, W. M., 183, 420.
Shawl, R. I., 489.
Shay, J. R., 270.
Shear, C. L., 523.
Shear, G. M., 521.
Shearer, G. D., 361.
Shearin, A. E., 518.
Shedd, C. K., 257.
Sheets, O., 267, 500.
Sheetz, D. A., 170.
Sheffield F. M. L., 326.
Sheldon, H. P., 336.
Sheldon, W. H., 594.
Shen, T., 150.
Shepard, C. E., 482.
Shepard, H. R., 172.
Shepard, P. H., 542, 544.
Shepherd, G., 740.
Sheppard, R. W., 707.
Sherf, A. F., 221.
Sherman, G. D., 6.
Sherman, H. C., 755.
Sherman, J. M., 274, 475.
Sherman, R. W., 741.
Sherrod, T. R., 528.
Sheybani, M. K., 722.
Shields, J. B., 563.
Shields, S. E., 715.
Shier, G. R., 121, 491.
Shires, L. B., 204.
Shirky, S. B., 509.
Shive, J. W., 3.
Shope, R. E., 319.
Short, W. F., 186.
Shreve, R. N., 152.
Shrewsbury, C. L., 103, 584, 718, 719.
Shuey, G. A., 263.
Shull, G. M., 773.
Shultz, J. F., 120.
Sibbitt, L. D., 8, 19, 20, 66. 149.
Sideris, C. P., 3, 4.
Siddons, L. B., 468.
Siegler, E. A., 556, 671.
Siegler, E. H., 706.
Sievers, A. F., 679.
Sievers, F. J., 509.
Sigel, M. M., 366.
Sigurdsson, B., 593.
Silver, W. H., 618.
Silveus, W. A., 437.
Simmonds, N., 756.
Simmonds, S., 503.
Simmons, J. S., 98.
Simmons, V. L., 350.
Simon, M. G., 636.
Simonds, A. O., 70, 697.
Simpson, J. I., 760.
Simpson, M. E., 103, 158, 201, 203, 277, 532.
Sinclair, W. B., 315, 428.
Singh, B. N., 37.
Singleton, W. R., 526.
Sinnott, E. W., 197.
Sisselman, C. B., 223.
Sisson, W. A., 650.
Skelley, W. C., 578.
Skoglund, N. A., 536.
Skoglund, W. C., 723.
Skok, J., 231.
Skolnik, H., 5.
Skrimshire, G. E. H., 186.
Slack, D., 699.
Slade, H. D., 32.
Slagg, C. M., 334.
Slagsvold, P. L., 381.
Slanetz, C. A., 358, 731.
Slate, W. L., 405.
Slatensek, J. M., 553.
Slater, L. E., 125, 737.
Sleesman, J. P., 340.
Slinger, S. J., 474.
Slocum, W. L., 386.
Sloviter, H. A., 6.
Slusher, M. S., 494.
Smadel, J. E., 251.
Small, T., 331.
Smiley, K. L., 274.
Smiley, W. G., 273.
Smith, A. D., 101.
Smith, A. H., 656.
Smith, A. K., 154, 273.
Smith, A. M., 534.
Smith, C. E., 590.
Smith, C. F., 317, 465, 572.
Smith, C. R., 145.
Smith, D. D., 519.
Smith, D. E., 150.
Smith, D. J. W., 113.
Smith, D. R., 561.
Smith, E., 669.
Smith, E. C., 204.
Smith, E. G., 527.
Smith, E. V., 90, 237, 586.
Smith, F. B., 290.
Smith, F. F., 709.
Smith, F. V., 124.
Smith, F. W., 173.
Smith, G., 523.
Smith, G. C., 48.
Smith, G. D., 169.
Smith, G. E., 175, 290, 417, 418, 419.
Smith, G. F., 38, 145.
Smith, G. M., 523.
Smith, G. S., 308, 665.
Smith, H. C., 484.
Smith, H. D., 346.
Smith, H. H., 196, 652.
Smith, H. J. C., 754.
Smith, H. M., 518.
Smith, H. P., 67, 257, 488.
Smith, H. R., 724.
Smith, H. W., 179, 619.
Smith, J. B., 160.
Smith, J. H. C., 429.
Smith, K. M., 549, 689.
Smith, L. E., 275, 276, 706.
Smith, L. F., 729.
Smith, L. J., 763.
Smith, L. T., 409.
Smith, M. A., 224.
Smith, M. I., 586.
Smith, M. R., 577.
Smith, O., 209, 210.
Smith, O. F., 323.
Smith, R. C., 89, 240, 338, 344, 407, 562.
Smith, R. E., 75.
Smith, R. M., 486.
Smith, R. S., 289.
Smith, S. E., 106, 118, 472.
Smith, T. E., 229, 320.
Smith, W. C., 156.
Smith. W. S., 59.
Smith, W. W., 312, 313, 463, 467.
Snell, E. E., 185.
Snider, G. G., 759.
Snieszko, S. F., 31.
Snodgrass, R. E., 99.
Snyder, E., 315, 675.
Snyder, G. B., 444.
Snyder, L. H., 43.
Snyder, W. C., 74, 81, 654, 693.
Snyder. W. E. 247.
Sober, H. A., 103, 469.
Sobin, B., 279.
Sobotka, H., 755.
Sokoloff, V. P., 88, 94, 333.
Solberg, E. D., 128.
Solem, M., 735.
Solheim, W. G., 686.
Sommer, H. H., 247, 585, 768.
Soper, J. D., 90.
Soraci, F. A., 337.
Sorenson, C. J., 569.
Soulides, D., 111.
Southam, C. M., 334.
Southwell, B. L., 485.
Southwick, F. W., 143.
Southwick, L., 42, 673.
Sowell, D. F., 582.
Sower, C. E., 750.
Sparrow, F. K., Jr., 292.
Speelman, S. R., 198.
Spencer, C. C., 236.
Spencer, D. A., 471.
Spencer, E. L., 291, 453.
Spencer, J. T., 55.
Spencer, L., 389, 599.
Spicer, M., 140.
Spics, J. R., 281.
Spies, T. D., 756.
Spillers, A. R., 680.

Spizizen, J., 223.
Sprague, G. F., 40, 152, 195, 616.
Sprague, P., 766.
Sprague, R., 227, 551, 681, 686.
Sprague, V. G., 38.
Sprowls, J. B., 115.
Spurlock, A. H., 747.
Spurlock, G. M., 101.
Spurway, C. H., 418.
Stableforth, A. W., 249.
Stadler, L. J., 652.
Stage, H. H., 98.
Stahelin, R., 220.
Stahl, G. W., 158.
Stahl, W. H., 479.
Stahler, L. M., 213.
Stahly, G. L., 279.
Stahmann, M. A., 114, 686.
Stains, G. S., 576.
Staker, E. V., 184.
Stakman, E. C., 195.
Stamberg, O. E., 21, 22.
Stammer, W. C., 408.
Standen, A., 90.
Standen, J. H., 80.
Standfast, A. F. B., 186.
Standley, P. C., 422, 450.
Stanfield, J. F., 635.
Stanfield, J. R., 296.
Stanford, C. E., 614.
Stanford, E. H., 39.
Stanley, L., 507.
Stanley, W. M., 279, 319, 328.
Stanley, W. W., 468.
Stanton, E. F., 582.
Stanton, T. R., 206.
Stanworth, J., 761.
Staple, W. J., 632.
Stare, F. J., 612, 767.
Stark, A. L., 541.
Stark, E. F., 270.
Stark, E. W., 270.
Starkey, R. L., 685.
Starr, G. H., 87.
Starr, M. P., 223.
Starr, S. H., 616.
Starr, V. P., 628.
Starrak, J. A., 597.
Staten, H. W., 53, 441.
Stauber, L. A., 98.
Stauber, M. F., 98.
Stauffer, R. S., 488.
Stearns, C. R., Jr., 168.
Stearns, L. A., 98.
Steele, J. G., 25.
Steele, J. H., 724.
Steenbock, H., 1, 139, 399.
Steenerson, T. L., 724.
Steer, H. B., 221.
Stein, C. D., 118, 359.
Stein, H. J., 591.
Stein, R. W., 357.
Steinbauer, G. P., 213.
Steiner, F., 342.
Steiner, L. F., 337, 342, 561, 713.
Steinhaus, E. A., 90, 113, 588.
Steinweden, J. B., 93.
Stejneger, L., 706.
Stephens, J. L., 55.
Stephens, S. G., 196.
Stephenson, C. C. S., 677.
Stephenson, R. B., 296, 310.
Stephenson, R. E., 26.
Sterges, A. J., 287.
Stevens, C. L., 281.
Stevens, H. E., 232.
Stevens, N. E., 292, 315.
Stevens, O. A., 65, 306, 444, 446.
Stevens, R. H. White-, 210.
Stevenson, A. C., 410.
Stevenson, F. J., 81, 207.
Stevenson, H. O., 4.
Stevenson, J. A., 681.
Stevenson, J. H., 597.
Stevenson, L., 559.
Steward, F. C., 426.
Stewart, A. J., 170.
Stewart, C. E., 383.
Stewart, C. L., 735.
Stewart, G. F., 357.
Stewart, J., 109.
Stewart, M. A., 563.
Stewart, R. N., 197, 655.
Stewart, W. L., 483.
Steyermark, J. A., 422.
Stiles, G. W., 487, 727.
Stillings, E. N., 316.
Stoa, T. E., 54, 60, 66.
Stoddart, L. A., 101, 102, 410.
Stoeckeler, J. H., 547.
Stoker, G. L., 62.
Stokes, J., 227.
Stokes, J. L., 637.
Stokes, W. E., 60, 437.
Stokoe, W. J., 658.
Stoll, N. R., 117.
Stoller, B. B., 667.
Storer, T. I., 89.
Storey, I. F., 693.
Stormont, C., 198
Storvick, C. A., 776.
Stott, L. H., 777.
Stotz, E. H., 408.
Stout, R. E., 357.
Stover, D. E., 594.
Strachan, C. C., 263, 614.
Straka, R. P., 3.
Strand, N. V., 595.
Street, O. E., 665.
Streets, R. B., 74.
Stringfield, G. H., 40, 57.
Strittmatter, T. P., 619.
Strong, F. M., 279, 514.
Stroud, R., 213, 311, 534.
Struble, F. B., 322.
Struble, G. R., 95.
Struck, H. C., 528.
Struckmeyer, B. E., 675.
Stuart, H. O., 722.
Stuart, L. S., 16.
Stubbs, E. L., 363, 726.
Stuewer, F. W., 559.
Stuntz, D. E., 235.
Sturgis, M. B., 521.
Sturkie, P. D., 200, 350.
Sudds, R. H., 60, 670.
Sudheimer, R. L., 254.
Suit, R. F., 697, 698.
Suksta, A., 591.
Sullam, V. B., 750.
Sullivan, J. T., 324, 652.
Sullivan, M. X., 7, 162.
Sullivan, W. N., 92, 567, 708.
Sullivan, W. R., 114.
Summerland, S. A., 342, 713.
Summers, W. A., 90.
Sumner, H. C., 517.
Sumner, R. J., 146.
Suneson, C. A., 51, 575, 686.
Supplee, G. C., 401.
Sure, B., 399, 504.
Svihla, R. D., 525.
Swales, W. E., 586.
Swallers, C. M., 60.
Swaminathan, M., 10.
Swanback, T. R., 442.
Swanson, A. F., 65, 211.
Swanson, C. A., 36, 193.
Swanson, C. O., 8, 20, 21.
Swanson, C. P., 70, 649, 653.
Swanson L. E., 360.
Swenson, S. P., 443.
Swift, L. J., 282.
Swingle, H. S., 90, 237.
Sydenstricker, V. P., 770.
Sykes, G., 186.
Synold, R. E., 580.
Szego, C. M., 436.

Taber, E., 203.
Tabusso, M. E., 144.
Talbert, T. J., 446, 542, 629.
Tanner, F. W., 607.
Tanner, F. W., Jr., 271.
Tanner, J. T., 560.
Tannor, B., 499.
Tapke, V. F., 77, 225.
Tartakowsky, H. S., 692.
Tate, H. D., 93, 338, 340, 468.
Tate, P., 241.
Tatum, L. A., 40, 58.
Tauber, A. H., 346.
Tauber, O. E., 93, 346, 708.
Taylor, A. E., 289.
Taylor, A. L., 360, 548.
Taylor, A. R., 368.
Taylor, C. C., 142, 498.
Taylor, D., 131.
Taylor, D. M., 501.
Taylor, G. E., 726.
Taylor, J. C., 579.
Taylor, J. W., 78.
Taylor, L. W., 199.
Taylor, M. H., 382, 735.
Taylor, M. W., 583.

Taylor, P. S., 749.
Taylor, R. E., 329.
Taylor, R. J., 623.
Teague, D. M., 137.
Teas, H., 287.
Tebbens, W. G., Jr., 275.
Tehon, L. R., 335.
Telford, C. J., 73.
Telford, H. S., 463, 510, 715.
Templeton, W. C., Jr., 66.
Tennant, J. L., 126, 599.
Tepper, A. E., 369.
Tereshtenko, V. J., 268.
Terrill, C. E., 720.
Terrill, S. W., 349.
Tervet, I. W., 319.
Terzaghi, K., 517.
Test, F. H., 47.
Tetreau, E. D., 596, 602.
Tetro, R. C., 381.
Thacker, E. J., 718.
Thalman, R. R., 470.
Thannhauser, S. J., 755.
Tharp, M., 408.
Thatcher, F. S., 79, 450.
Thayer, C. L., 444.
Thayer, J. W., Jr., 57.
Thayer, R. H., 408.
Thewlis, J. D., 127.
Thiessen, E. J., 135.
Thirumalachar, M. J., 557.
Thomas, B. H., 350.
Thomas, H. R., 555, 694.
Thomas, I., 689.
Thomas, J. O., 115.
Thomas, L., 587.
Thomas, M. D., 643, 646.
Thomas, R. C., 450.
Thomas, W., 180.
Thomas, W. P., 130, 617, 744.
Thompson, B. G., 343, 564.
Thompson, H. H., 263, 500, 608.
Thompson, H. W., 574.
Thompson, J. C., 433.
Thompson, J. G., 182, 522.
Thompson, L. C., 648.
Thompson, L. M., 519.
Thompson, N. F., 315.
Thompson, P. E., 254.
Thompson, R. B., 352, 354.
Thompson, R. C., 34, 527, 638.
Thompson, R. R., 159.
Thompson, R. W., 91, 707.
Thompson, W. C., 303, 722, 760.
Thompson, W. L., 238.
Thomsen, F. L., 381.
Thomson, B. F., 780.
Thomson, J. W., Jr. 186.
Thomson, W., 739.
Thorning, W. M., 119, 592, 731.
Thornthwaite, C. W., 413, 627.
Thornton, M. H., 154.
Thornton, N. C., 647, 648.
Thorp. F., Jr., 727, 730.
Thorp, J., 169.
Thorp, W. T. S., 483.
Threlkeld, W. L., 112, 114, 365.
Thurston, H. W., Jr., 639.
Thurston, L. M., 623.
Tiedjens, V. A., 321, 633.
Tighe, L. W., 245.
Tikhov, G. A., 517.
Tilford, P. E., 88, 700.
Tillman, A. D., 107.
Timberlake, P. H., 345, 468.
Timmons, J. F., 735.
Timonin, I., 481.
Timonin, M. I., 33.
Timoshenko, V. P., 261, 600.
Tims, E. C., 698.
Tinley, J. M., 130.
Tirrell, L. V., 368.
Tischer, R. G., 636.
Tiscornia, J., 167.
Tisdale, E. W., 536.
Tisdall, F. F., 755.
Tiselius, A., 477.
Tissot, A. N., 241.
Tobey, E. R., 214.
Tobgy, H. A., 285.
Tocchetto, A., 552.
Todhunter, E. N., 138.
Toit, R. du, 346.
Tolaas, A. G., 207.
Tolley, H. R., 747.
Tolman, B., 62, 540.
Tolstead, W. L., 524.
Tomhave, A. E., 474, 723.
Tooke, F. G. C., 238.
Toth, S. J., 30, 181.
Totman, C. C., 475.
Townsend, G., 386.
Townsend, M. C., 141.
Tracy, P. H., 109, 110, 249.
Trager, W., 98, 99, 586.
Trainer, D., 364.
Traves, C. W., 108.
Travis, B. V., 98, 343, 345.
Travis, G. E., 706.
Trembley, G. L., 336.
Tremearne, T. H., 182.
Trenary, O. J., 493.
Tressler, C. J., 271.
Tressler, D. K., 133, 263, 400, 403.
Tretsven, J. O., 355.
Trimberger, G. W., 436.
Trotter, I. P., 60.
Trout, G. M., 247, 584, 610.
Trowbridge, E. A., 103, 470, 578.
Troxell, H. C., 732.
Tryon, H. H., 317.
Tschudy, R. H., 33.
Tucker, C., 135.
Tucker, C. M., 459.
Tucker, E. A., 121, 382, 494.
Tukey, H. B., 69, 671.
Tulaikov, N. M., 289.
Tunnicliff, E. A., 511.
Turk, K. L., 354.
Turk, L. M., 517.
Turner, C. N., 377.
Turner, C. W., 47, 199, 306, 409, 435, 436, 529, 656.
Turner, D. F., 612.
Turner, D. L., 277.
Turner, J. D., 635.
Turner, K., 106.
Turner, N., 567.
Turney, G. J., 475.
Turrell, F. M., 137, 285, 333, 651, 699.
Tuthill, L. H., 255.
Tuttle, A. H., 731.
Twinn, C. R., 91, 94, 707.
Twinn, T. R., 338.
Twitchell, K. S., 739.
Tyner, E. H., 522.
Tyner, L. E., 79.
Tysdal, H. M., 652.
Tyson, J., 58.

Ullstrup, A. J., 227, 319, 552.
Ullyett, G. C., 238.
Ulrey, O., 598.
Ulrich A., 27.
Ulrich, H. P., 518.
Ulshafer, P. R., 277.
Umberger, E. J., 281.
Umbreit, W. W., 32, 637.
Underhill, G. W., 569.
Underkofler, L. A., 185.
Unrau, J., 664.
Upshall, W. H., 69, 671.
Usinger, R. L., 94.
Ustenko, G. P., 192.
Utter, M. F., 146.

Vail, G. E., 132, 762.
Valleau, W. D., 83, 229, 552.
Vallega, J., 226.
Van Blaricom, L. O., 607.
Van Bruggen, J. T., 480.
Vandecaveye, S. C., 176, 563.
Vanderford, H. B., 171.
Van der Meulen, E., 536, 538.
Van Der Noot, G., 722.
Van Doren, C. A., 488, 536.
Van Geluwe, J., 340, 695.
van Herick, W., 252.
Van Leeuwen, E. R., 713.
Van Royen, W., 131.
Vanselow, A. P., 416.
Van Slyke, D. D., 148.
van Veen, A. G., 756.
Van Zwaluwenburg, R. H., 574.
Varney, K. E., 780.
Vasudeva, R. S., 324.
Vaughan, E. K., 694.
Vaughn, R. H., 515.
Vázquez Calcerrada, P. B., 387.

Vedder, E. B., 756.
Veihmeyer, F. J., 35.
Vélez, M., 387.
Vélez Fortuño, J., 74.
Venables, E. P., 242, 569.
Verburg, R. M. 352.
Verner, L., 70, 190, 672.
Verrall, A. F., 89.
Vestal, A. G., 423.
Vestal, C. M., 103.
Vickery, H. B., 16, 147, 270.
Viégas, A. P., 692.
Vilkomerson, H., 653.
Villagrán, F. P., 422.
Vincent, C. L., 214, 217.
Vinson, C. G., 574.
Virgin, W. J., 552.
Visher, S. S., 166, 289, 628
Voblikova, T. V., 37.
Vogel, F. H., 271, 318.
Vogel, M. A., 339.
Vogel, O. A., 443.
Voght, G. B., 561.
Vogler, K. G., 637.
Volin, L., 495.
Volk, G. M., 60.

Waddell, D. B., 239, 569.
Wade, B. L., 67, 311, 402.
Wadleigh, C. H., 427.
Wadley, F. M., 565, 708.
Wagner, E. C., 6.
Wagner, J. R., 582.
Wagner, R. B., 277.
Wagoner, J. A., 152.
Wain, R. L., 452.
Wainio, W. W., 400.
Waisman, H. A., 107, 348, 504.
Waite, W. C., 142.
Waksman, S. A., 31, 186, 291, 359, 685.
Walden, D. C., 482.
Waldron, L. R., 66.
Walkden, H. H., 706, 714.
Walker E. A., 319.
Walker, G. H., 723.
Walker, H. G., 562, 570.
Walker, J. C., 80, 84, 686, 693.
Walker, J. F., 349.
Walker, L., 52.
Walker, L. S., 160, 718.
Walker, M. N., 68, 618.
Walker, R. H., 510.
Walker, W. P., 383, 384, 389.
Wall, M. E., 139.
Wallace, B. A., 748.
Wallace, T., 681.
Waller, E. F., 368, 369.
Wallis, G. C., 474.
Wallis, R. L., 464.
Walshie, B. M., 241.
Walster, H. L., 306, 440, 510.
Walter, E. D., 282.
Walter, J. M., 557.
Walter, W. G., 586.
Walters, C. S., 318.
Walters, L., 6.
Waltman, C. S., 7.
Wan Chen, W. -H., 157.
Wander, I. W., 4, 672.
Wang, H., 46.
Wang, Y., 31.
Wang, Y. L., 626.
Wann, F. B., 71.
Wanstall, G., 747.
Ward, A. L., Y., 756.
Ward, E. N., 45.
Ward, G. B., Jr., 681.
Ward, H. B., 413.
Ward, H. M., 405.
Warder, F. G., 206.
Ware, L. M., 62, 207.
Ware, W. W., 681.
Waring, W. S., 32.
Warmke, H. E., 430.
Warne, L. G. G., 36, 300.
Warner, R. C., 278.
Warren, D. C., 202.
Warren, S. W., 381.
Warth, A. H., 263.
Washa, G. W., 256.
Washburn, R. S., 218, 385.
Wasserman, P., 254.
Waterhouse, W. L., 227, 323.
Waterman, A. M., 702.
Waterman, E. L., 732.
Waters, N. F., 200.
Wathen, A. L., 739.
Watson, A. E., 619, 735.
Watson, A. J., 703.
Watson, D. W., 251.
Watson, I. A., 225, 227, 323.
Watson, J. R., 93, 237.
Watson, M. A., 327.
Watson, S. A., 296.
Watson, S. J., 347.
Watts, R. L., 336.
Watts, V. M., 445.
Waugh, W. R., 256.
Weaver, F. L., 707.
Weaver, J. E., 423.
Weaver, L. A., 105, 471.
Weaver, L. O., 271, 450.
Weaver, R. H., 279.
Weber, G. F., 456, 702.
Webster, L. T., 252.
Webster, R. L., 563.
Weckel, K. G., 724.
Weed, L. A., 590.
Weeks, D., 735.
Wegner, M. I., 620.
Wehrle, W., 287.
Wehrwein, G. S., 735.
Weihing, R. M., 204.
Weimer, J. L., 74, 227.
Weinberger, J. H., 697.
Weindling, R., 74, 454.
Weinstein, L., 250.
Weir, T. S., 68, 217.
Weirether, F. J., 362.
Weiss, F., 74, 319, 548, 681.
Weiss, H. B., 337, 707.
Weiss, J. E., 223.
Weiss, M. G., 652.
Weitzell, E. C., 743.
Welch, C. H., Jr., 659.
Welch, F. J., 61, 122, 204, 779.
Welden, W. C., 126.
Weldon, M. D., 179.
Weldon, T. A., 28.
Welker, E. L., 779.
Wellhausen, E. J., 74.
Wellman, F. L., 86, 449, 555.
Wellwood, R. W., 72.
Wendt, K. F., 256.
Wene, G., 337, 562.
Went, F. W., 35, 189, 190, 642.
Werkman, C. H., 1, 32, 146.
Werkman, G. H., 147.
Werner, H. O., 206, 207.
Wernimont, K., 734.
West, G. A., 22, 213.
Wester, R. E., 42.
Weston, W. A. R. D., 329, 687.
Wetmore, T. H., 679.
Wexler, H., 627.
Whalley, M. E., 349.
Wheeler, C. M., 361, 482.
Wheeler E. J., 81.
Wheeler, N. H., 711.
Wheeting, L. C., 123.
Whetten, N. L., 751.
Whetzel, H. H., 523, 686.
Whipple, C. E., 496.
Whipple, G. W., 612.
Whitcomb, W. H., 562.
Whitcomb, W. O., 444.
White, A., 711.
White, A. H., 248.
White, E. A., 271.
White, E. C., 639.
White, E. G., 721.
White, E. V., 273.
White, G. V., 289.
White, H. E., 448.
White, J. C., 475.
White, L. M., 179.
White, M. J. D., 284.
White, N. H., 424.
White, P. R., 187, 296, 297, 550, 643.
White, W. B., 253.
White, W. J., 659.
White, W. T., 306.
Whitehead, M. D., 64.
Whitehead, M. R., 68.
Whitehead, T., 689.
Whitehurst, V. E., Jr., 721.
White-Stevens, R. H., 210.
Whitman, W., 438.
Whitney, R. S., 174.
Whitson, D., 244.
Whitt, D. M., 175.
Whittaker, C. W., 163, 179, 184.
Whittemore, M. B., 137.
Whitten, L. K., 587.
Wiancko, A. T., 270.

Wiant, D. E., 594.
Wichmann, H. J., 10.
Wickard, C. R., 141.
Wiebe, G. A., 51.
Wiebe, R., 120.
Wiegand, E. H., 602.
Wiehl, D. G., 766.
Wiggins, I. L., 66.
Wiidakas, W., 307.
Wilbar, C., Jr., 756.
Wilbur, D. A., 97, 339.
Wilcox, A. N., 68, 217.
Wilcox, J., 337.
Wilcox, J. C., 216.
Wilde, S. A., 522.
Wildman, S. G., 34.
Wileman, R. H., 489.
Wilhelm, S., 701.
Wilkes, A., 91.
Wilkinson, E. H., 452.
Wilkowske, H. H., 248.
Willerton, E., 624.
Willett, E. L., 48, 49, 243.
Williams, C. B., 707.
Williams C. S., 246.
Williams, D., 512.
Williams, E. M., 38.
Williams, G. Z., 361.
Williams, H. H., 137.
Williams, L. F., 116.
Williams, L. L., 98.
Williams, L. L., Jr., 99.
Williams, Q., 717.
Williams, R. J., 147 621, 753.
Williams, R. R., 756.
Williams, W. O., 677.
Williamson, M. B., 529.
Williamson, P. S., 738.
Willis, J. H., 292.
Willis, L. G., 439.
Willis, R. L., 92, 214.
Willman J. P., 485, 722.
Willmann, A., 157.
Wills, H. M., 25.
Wilson, E., 277.
Wilson, E. B., 510.
Wilson, E. E., 321, 333 696.
Wilson G. S., 110, 725.
Wilson H. F., 93, 571.
Wilson H. K., 213.
Wilson, J. B., 32, 278, 294.
Wilson J. D., 26, 86, 331, 668, 733.
Wilson J. L., 291.
Wilson, M. L., 268.
Wilson, P. W., 32, 278, 294, 295, 636.
Wilson, W. O., 125.
Wilster, G. H., 357.
Winchester, C. F., 437.
Wingo, C. W., 467.
Winston, J. R., 556.
Winston, S., 498.
Winter, J. D., 68, 133, 217.
Winterberg, S. H., 182, 420. 522, 634.
Winters, L. M., 198, 302.
Winters, R. K., 545, 681.
Wintrobe, M. M., 591.
Wintrode, V. H., 512.
Wirth, J. C., 187.
Wishart, G., 91, 707.
Wisnicky, W., 44.
Withrow, A., 618.
Withrow, A. P., 189, 446.
Withrow, R. B., 189, 446, 618, 649.
Withell, E. R., 725.
Wittbecker, E. L., 277.
Wittenkamp, R., 522.
Wittle, E. L., 277.
Wodicka, V. O., 263.
Woglum, R. S., 340.
Wohl, K., 37.
Wokes, F., 775.
Wolcott, G. N., 714.
Wolf, F. T., 168.
Wolf, H. W., 720.
Wolf, W. W., 182.
Wolfe, H. S, 545.
Wolfenbarger, D. O., 92, 716.
Wolfson, F., 593.
Wood, F. C., 17.
Wood, J. G., 297.
Wood, J. K., 177.
Wood, L K., 29.
Wood, S. F., 592.
Wood, S. L., 562.
Woodbridge, C. G., 216.
Woodburn, R., 413.
Woodbury, G. W., 672.
Woodhouse, W. W. Jr., 53.
Woodman, H. E., 347, 350.
Woodmansee, C. W., 164, 284.
Woodroof, J. G., 24, 263, 500, 605, 607, 608, 609.
Woodruff, C. M., 177.
Woodruff, S., 756.
Woods, B. M., 628.
Woods, K. B., 518.
Woods, M. W., 231, 549, 684.
Woodside, A. M., 462, 705.
Woodsworth, H. N., 108.
Woodward, C. R., Jr., 637.
Woodward, R. W., 39, 51.
Woodworth, C. E., 561.
Woodworth, H. C., 389, 738.
Wooley, J. C., 492.
Woolley, D. W., 647.
Wooster, J. L., 71, 127.
Wong, R., 724.
Worcester, J., 510.
Worden, A. N., 721.
Work, P., 761.
Work, S. H., 348.
Working, E. B., 429.
Worsham, W. E., 521.
Worthing, A. G., 779.
Worthy, W. L., 93.
Worzella, W. W., 212, 516.
Wrather, S. E., 381.
Wright, D. W., 574.
Wright, E., 334.
Wright, K. T., 598.
Wright, M, 127.
Wright, S., 526.
Wright, W. H, 118.
Wulff, E. V., 293.
Wurtz, E., 504.
Wyatt, B. W., 18.
Wylie, K. H., 127, 142.
Wylie, R. B., 430.
Wynd, F. L., 83, 187, 456, 684, 779.
Wynne, W., 261.

Yale, M. W., 476, 512.
Yarnell, S. H., 38.
Yarwood, C. E., 85, 222, 685.
Yeager, C. C., Jr., 229.
Yeager, L. E., 89.
Yeates, N. T. M., 242.
Yeatter, R E., 462.
Yee, H., 604.
Yeomans, A. H., 710.
Yocom, C. F., 560.
Yoder, R. E., 659.
York, H. A., 204, 439.
Youmans, J. B., 611.
Young, A. L., 489.
Young, C. M., 767.
Young, E. J., 606.
Young, G. T., 168.
Young, G. Y., 74, 554.
Young, H. A., 278.
Young, H. C., 331, 691.
Young, H. D., 337.
Young, H. E., 548.
Young, J. B., 183, 420.
Young, L. A., 140.
Young, M. B., 278.
Young R. M., 282.
Young, T. R., Jr., 712.
Young, V. H., 74.
Younge. O. R., 184.
Younkin S. G., 689.
Yuncker, T. G., 186.
Yust, H. R., 561, 712.

Zach, L. W., 72.
Zander, D. V., 2.
Zehngraff, P. J., 72, 318.
Zeleny, L., 7.
Zelle, M. R., 482, 719.
Zeller, J. H., 432.
Zeller, S. M., 231, 639.
Zietlow, R., 18.
Zimmerman, F. L., 142.
Zimmerman, H. E., Jr., 360.
Zimmerman, P. W., 188, 525
Zingg, A. W., 628.
Zitcer, E., 504.
Zlotowski, I., 3.
Zobler, L., 179.
Zscheile, F. P., 161, 648.
Zuber, M. S., 56, 57, 58.
Zucker, T. F. 768.
Zwilling, E., 46.

INDEX OF SUBJECTS

NOTE.—The abbreviations "Ala.", "Conn.[New Haven]", "Mass.", etc., after entries refer to the publications of the respective State experiment stations; "Hawaii" and "P.R.U." to those of the experiment stations in Hawaii and Puerto Rico (University station); and "U.S.D.A." to those of this Department.

Abortion—*see also* Bang's disease *and Brucella abortus*.
    equine, diagnosis, 254.
Acanthoscelides obtectus, *see* Bean weevil.
Acariscus, new genus of chiggers, 100.
Accidents, farm, in Ohio, nature, causes, and costs, 749.
Acetobacter suboxydans, growth requirements, 185.
Achlya, sexual hormones in, 34.
Acidia heraclei, larval stages, and associated parasitic yeastlike fungus, 241.
Acids—
    amino, *see* Amino acids.
    fatty, *see* Fatty acids.
Aconitic acid, its salts and derivatives in sorgo and sugarcane products, 515.
Aconitum velatum tolerance to extreme acidity and high copper sulfate concentrations, 685.
Acrodynia, rat, body fats in, 399.
Acrostalagmus—
    goniodes n.sp. parasitizing nematodes, 76
    tagenophorus n.sp. destroying rotifers, 76.
Actinomyces—
    antagonism to *Fusarium oxysporum cubense*, 320.
    isolated from a dog, 112.
    production of thiamine by, 641.
    scabies demonstrated by fluorescence microscopy, 689.
    strains, pigment production of, 637.
Actinomycosis or lumpy jaw, U.S.D.A. 482.
Adelura apii, larval stages, and associated parasitic yeastlike fungus, 241.
Adrenalectomy, effect on arginase activity of rat livers, 201.
Aecidium carthami on safflower, 702.
Aedes—
    aegypti strain selected for susceptibility to avian malaria parasite *Plasmodium lophurae*, 99.
    mosquito eggs, distribution on salt marshes in Florida, 343.
    sollicitans, *see* Mosquito, salt-marsh.
Aegilops to *Agropyron*, host-parasite checklist revision, U.S.D.A. 319.
Aerobacter
    aerogenes, action on vitamin C, 282.
    indologenes, assimilation of acetic and succinic acids containing heavy carbon by, 32.
Aerology, *see* Air *and* Atmospheric.
Aerosols—
    germicidal, studies, aerosol centrifuge, 726.
    insecticidal, production, 237, 340, 568.
Agar—
    from red algae, 33.
    from South African seaweeds, 636.
    medium, new, for *Drosophila* culture, 51.
    substitute in fungus culture media, 449.
Agaricus campestris single-spore cultures, method for obtaining, 292.
Aging, problems of, biological and medical aspects, 335.
Aggregate(s)—
    coarse, developments in methods of testing and specifying, 255.
    grading at Hiwassee Dam, effect of grinding in large mixers, 256.
Agrarian order, new, in Nazi-invaded Russia, U.S.D.A. 495.
Agricultural—
    area, marginal, rural underemployment and land use in, W.Va. 743.
    colleges—*see also specific colleges*
        organization list, U.S.D.A., 406.
    commodities and their products, maximum prices, U S D.A. 601.
    Conservation and Adjustment Administration, 1942 report, 141.
    conservation program, experimental, in Licking Co., Ohio, 746.
    cooperation in Venezuela, 127.
    credit—
        in Aroostook Co., Me. 746.
        short-term, on lower Eastern Shore, Md. 384.
        short-term, sources and conditions, attitudes of farmers toward, 746.
        system of Mexico, U.S.D.A. 127.
    experiment stations, *see* Experiment stations.

Agricultural—Continued.
- finance guides in wartime, 734.
- Finance Review, U.S.D A. 746.
- goals, technics for achieving, 381.
- income, gross cash, from sale of farm products and from A. A. A. payments for Ohio farms, 746.
- information, Appalachian region, atlas of, U.S.D.A. 382.
- journals, new, 144.
- labor—*see also* Labor.
  - adjustments after World War I, 381.
  - and food production, 381.
  - and power situation in North Carolina, N.C. 596.
  - available in an urban center, N.C. 744.
  - in Indiana, economic study, Ind. 596.
  - in United States, July 1941–February 1943, bibliography, U.S.D.A. 744.
  - inexperienced, use on Ohio farms, 745.
  - needs for seasonal operations on New Mexico farms, N.Mex. 260.
- labor requirements—
  - by commodities, list of publications on, U.S.D.A. 130.
  - for crops and livestock, U.S.D.A. 385 .
  - for 1943 production goals, Utah 744.
  - in Maryland, Md. 596.
- labor shortages, artificial, cultural factors resulting in, 750.
- labor situation—
  - effect on agricultural production in Corn Belt, 381.
  - in Canada, 381.
  - in Iowa, 381.
  - in Ohio, 381, 735, Ohio 130.
  - on Wisconsin dairy farms, U.S.D.A. 130.
  - organizing for outside help, Calif. 130.
- labor survey, S.C. 597.
- labor, wartime mobilization in South Dakota, S.Dak. 386.
- laborers, social and economic status, effect of war on, 749.
- machinery—*see also* Combines, Cultivator, Tiller, *etc.*
  - cost of operating in eastern Canada, 599.
  - for harvesting sweetpotato vines for livestock feed, N.C. 491.
  - imported, local adaptations, Hawaii 489.
  - in critical state, aid for, N.Y.State and Cornell 385.
  - operating economics, effect of full load on, 374.
  - over-all performance of series combinations, effect of reliability of individual units, 374.

Agricultural—Continued.
- machinery—continued.
  - problems in peanut production, 257.
  - rental charges on, guide for calculating, Colo. 406.
  - rental rates and charges for custom work, determining, Okla. 121.
  - rental rates for, Mo. 124, N.Dak. 381.
  - repair program, 377.
- mission of United States to Saudi Arabia, report, 739.
- policy and food management, wartime, 740.
- post-war planning in Canada, 381.
- post-war problems in Utah defense area, Utah 617.
- price policy, 381.
- production—
  - adjustments in Ohio, wartime, 740.
  - and war labor supply in eastern Kentucky, Ky. 744.
  - effect of land purchase by F. S. A. standard loan borrowers in northern Great Plains, 735.
  - efficiency, effect of managerial ability and farm size, 381.
  - policy, British, U.S.D.A. 127.
- products—
  - commodity loans and price floors for, 740.
  - marketing, *see* Marketing.
  - prices received by Alabama farmers for, Ala. 128.
  - tire-use expectancy of trucks hauling, Ill. 261.
- programs in south-central Indiana, guide to, Ind. 601.
- reconstruction in China, U.S.D.A. 495.
- research at Rothamsted, 510.
- research, spectrography in, 1.
- science instruction in Yale University, 144.
- situation and price and purchasing power data, Okla. 121.
- statistics, U.S.D.A. 129.
- tenancy, *see* Farm tenancy, Farm tenure, *and* Land tenure.

Agriculture—
- after the war ends, 381.
- and home economics, cooperative extension work in, report, U.S.D.A. 268.
- and land use effect of strip mining of coal in eastern Ohio, 735.
- and wartime prices, Md. 390.
- bibliography of, 512.
- Department of, *see* United States Department of Agriculture.
- German, collective bargaining in, under Weimar Republic, 1918–1933, 381.
- in an expansionist economy, 381.
- in Iranian trade agreement, U.S.D.A. 496.
- in the year ahead, 739.

- Agriculture—Continued.
  - in Yakima Valley, Sunnyside Division, economic conditions and problems, Wash. 738.
  - manpower in, 740.
  - of Cuba, U.S.D.A. 127.
  - of Iowa, suitability of the township as unit for sampling, Iowa 595.
  - Second Inter-American Conference of, final act, 260.
  - vocational, supervised farming in, 734.
- *Agrilus anxius, see* Birch borer, bronzed
- Agronomy, laboratory manual for students, 754.
- *Agrostis* to *Aristida* host-parasite check-list revision, U.S.D.A. 319.
- *Agrotis, see* Cutworm(s).
- Air—*see also* Atmospheric.
  - pump of low capacity, description, 429.
  - upper, microbiology of, 168.
- Airplane runways damaged by ants, 562.
- *Alabama argillacea, see* Cotton leafworm.
- Alanine effect on lactic acid bacteria, 185.
- *Albizzia*, new pest of, in District of Columbia, 238.
- *Albugo tragopogonis* white rust of sunflowers, 692.
- *Alcaligenes fecalis*, vitamin synthesis by, 769.
- Alcohol—
  - and air mixture, theoretical, Mollier diagrams for, 120.
  - and water system, nitromethane-isopropyl, 145.
  - industrial, from citrus waste press juice, 158.
  - polyvinyl, for mounting and clearing biological specimens, 412.
- *Aleyrodes azaleae, see* Azalea whitefly.
- Alfalfa—
  - and Korean lespedeza in grass mixtures, changes in proportion and yield, 52.
  - as silage and hay, conservation of nutrients, Vt. 468.
  - boron content, 428.
  - Ca : K ratios for, 30.
  - cold and drought resistance in, relation to amount of fall top growth remaining, 660.
  - cost of production on different soil types, Ind. 124.
  - fungi affecting, U.S.D.A. 686.
  - green, and as hay, feeding value, 718.
  - hay, high-grade, producing, baling, and loading for market, U.S.D.A. 537.
  - in eastern Washington, Wash, 439.
  - on irrigated farms, marketing, cattle feeding method, N.Mex. 737.
  - response to identical Ca-K ratios in soil and in sand cultures, comparison, 420.
  - *Rhizoctonia* sp. infecting, 552.
  - seed oil, sterols of, 277.
  - seed set in, effect of borax, 54.
  - stem nematode on, 323.
- Alfalfa—Continued.
  - sulfur nutrition, use of sulfate and sulfur dioxide for, 646.
  - value in nutrition of breeding ewes, 710.
  - varieties and seeding studies, N.J., 51.
  - varieties, comparative performance in nursery and irrigated field plats infested with *Phytomonas insidiosa*, 204.
  - varieties for Montana, Mont. 439.
  - variety tests, N.Mex. 534.
  - weevil damage, prevention and control, U.S.D.A. 345.
  - weevil, Egyptian, studies, 91.
  - weevil, report of special committee to investigate, 91.
  - winter survival in fall sown plats, 659.
  - yields, effect of phosphate and manure, N.Mex. 534.
- Algae, red, agar-bearing species, 33.
- Algal flora of Florida soils, 290.
- Allantoin, effect of direct applications to cells in vitro, 250.
- Allergens, chemistry of, 281.
- *Allotropa*, new species, 100.
- Almond diseases, in Morocco, symptoms and control, 231.
- *Alternaria*—
  - *radicina* on carrot, 230.
  - *solani* nonchromogenic sporulating variant, 555.
  - *solani* on tomato leaflets, technic to compare virulence of isolates of, 555.
  - sp. on grain killed by high temperature storage, 225.
- *Alydus eurinus* and *A. pilosulus*, pests of legumes, 569.
- Amaranthus stem weevil parasite, biology, 717.
- *Amblyomma*—
  - *americanum, see* Tick, lone star.
  - *hebraeum* attachment to mucous membrane of mouths of cattle, 346.
- Ambrosia beetles, fungi associated with, 89.
- American—
  - Farm Economics Association, papers, 380.
  - Society of Animal Production, proceedings, 101.
- Amino acids—
  - and proteins, chemistry of, 755.
  - and proteins, metabolism of, 755.
  - phospho-12-tungstates of, solubilities and compositions, 148.
  - polarographic behavior, 16.
  - α-, synthesis, from substituted acetoacetic esters, 16.
- 1-Aminobenzo (f) quinolines and derivatives, 276.
- 5-Aminobenzo (f) quinolines and derivatives, 276.
- *p*-Aminobenzoic acid, *Lactobacillus* assay method for, 412.
- 4-Amino-2-methyl-1-naphthol detection and quantitative determination, 627.

- Ammonia decomposition over doubly promoted iron catalysts—
  - adsorption of N and the mechanism of, 273.
  - effect of alkali promoter concentration, 273.
- Ammonia, determination by diffusion method, 3.
- *Amphimallon majalis*, life history, 562.
- Analytical methods, reports of referees on, 160.
- *Anasa tristis*, *see* Squash bug.
- *Anastrepha ludens*, *see* Fruitfly, Mexican.
- Anemia—
  - equine infectious, transmission of subclinical form by *Psorophora* mosquitoes, 118.
  - in college boys and girls, prevalence, Miss. 267.
  - in pigs and pyridoxine deficiency, 591.
  - of flexed-tailed mice, 302.
- Aneurin, *see* Vitamin B_1.
- Angola, Portuguese West Africa, U.S.D.A. 495.
- Animal(s)—*see also* Cattle, Livestock, Mammals, Sheep, *etc.*
  - and man, brucellosis in, 586.
  - and plant resources of Alaska, 704.
  - disease(s)—*see also specific diseases.*
    - control, fundamentals, 724.
    - dissemination in Australia, effect of wild animals in, 724.
    - infectious, etiology, diagnosis, and biologic therapy, 358.
  - domestic, fate of phenothiazine in, 586.
  - domestic, growth and development, Mo. 577, 584.
  - farm, nutrition and reproduction of, 103.
  - fats, *see* Fat(s).
  - food habits studies, directions for collecting materials for, 704.
  - laboratory, adequacy of improved stock diets for, 358, 731.
  - laboratory, infection with *Mycobacterium johnei*, 587.
  - muscular-work capacity, index of, 578.
  - parasites, *see* Parasites.
  - pathogenic fungi isolated from, 112.
  - skeletal development, effect of oestrogens and androgens, 305.
  - soil, in Duke Forest, effects of burning-over and raking-off litter on, 236.
  - young, management, N.Dak. 348.
- *Anopheles—see also* Malaria *and* Mosquito(es).
  - mosquitoes, papers on, 98.
- Ant(s)—
  - airplane runways damaged by, 562.
  - Argentine, v. parasites of black scale, 99.
  - Pharaoh, thermal preference by, as guide in control, 91.
  - white, *see* Termite(s).
- *Anthonomus grandis*, *see* Boll weevil.
- *Anthonomus signatus*, *see* Strawberry weevil.
- Anthracnose, control on cannery tomatoes, 224.
- Anthrax—
  - diagnosis, laboratory, 359.
  - symptomatic, *see* Blackleg.
- Antibiosis production and strain specificity, 186.
- Antigens, genetic segregation of, 47.
- Antiseptics commonly used, germicidal and bacteriostatic properties, 115.
- *Aonidiella*—
  - *aurantii*, *see* Red scale, California.
  - *ensifera* n.sp., description, 94.
  - *paucitatis* n.sp., description, 94.
- Aphids—
  - citrus, control, 237.
  - control on collards with rotenone-nicotine dusts, 562.
  - increase on potato plants sprayed with zinc arsenite, 340.
  - new western, 464.
- *Aphis*—
  - (*Doralis*) *rhamni*, life history, 689.
  - *gossypii*, *see* Cotton aphid.
- *Apion ulicis*, use in New Zealand for control of gorse, 96.
- Apparatus—
  - concentric tube type for vacuum fractionation, 2.
  - for catalase determination, simplified, 159.
  - for continuous concentration of a solution under reduced pressure, 159.
  - for crystallization and filtration at low temperatures, 1.
  - for making shadowgraphs of oats seedlings, 34.
  - for testing chemotropic responses of flying insects, 337.
  - glass valve pressure regulator, 1.
  - leakproof stopcock for regulation of take-off during distillation, 2.
  - pressure-measuring, for vacuum distillations, 158.
- Apple(s)—
  - bitter pit, effect of horticultural practices in Okanagan Valley, B. C., 695.
  - bitter rot control, Del. 459.
  - bitter rot, eradicant sprays for, 332.
  - blotch control, bordeaux mixture substitute for, U.S.D.A. 74.
  - blotch, eradicant sprays for control, 332.
  - boxes, absorption of moisture by, 544.
  - breeding plans, 42.
  - changes in, during ripening and storage, N.H. 313.
  - Comstock mealybug damage to, in New Jersey, 569.
  - copper on, determination in presence of lead arsenate, 165.
  - cost of drying, Calif. 386.
  - dehydrated, methods of drying, storage, and cooking, R.I. 397.
  - diseases—
    - control in northern Illinois, 332.
    - in Ohio, 331.
    - in Ozark section of Arkansas, U.S.D.A. 74.

Apple(s)—Continued.

- dried, inactivation of browning system in, 640.
- effect of fertilizing elements on, N.H. 312.
- false sting, transmission tests by grafting, 695.
- fire blight control with pollenicides, 232
- flat limb, transmission tests by grafting, 695.
- fruit maturity and growth, effect of boron content, 69.
- fruits, thinning, and changing year of bearing by spraying with dinitro compounds, Ohio 313.
- grafts and layers, disease of, caused by *Rhizoctonia solani*, 87.
- grafts, scion rooting as related to vegetativeness of scions used, 670.
- grown on own and seedling roots, variability in top weight and yield, 670.
- high and low grades, experiment with retail sales, 743.
- Illinois, water core in, 673.
- insects in Connecticut, reduced schedules for control, 562.
- juice, ascorbic acid retention in, 614.
- juice, pathogenic bacteria in, longevity, 607.
- leaves, potassium in, effect of soil management, 673.
- maggot, female reproductive system, development, 241.
- magnesium deficiency, symptoms of, N.Y.State and Cornell 313.
- Malling IX, dwarfing effect of intermediate stem-piece, 671.
- Malling stocks and French crab seedlings as stocks for, 671.
- McIntosh, preharvest drop in, N.H. 313.
- mosaic, transmission tests by grafting, 695.
- nature of clonal variety, cytological studies of bud sports, Mich. 670.
- nutritional value, 394.
- orchard(s)—
  - control of field mice in, Va. 705.
  - effect of heavy mulch on soil constituents and mineral content of foliage and fruit, 672.
  - home management, Ohio 68.
  - in Massachusetts, magnesium deficiency, 673.
  - in Nova Scotia, effect of weather in 1942, 629.
  - land, crops and cultural practices on, Idaho 672.
  - New York, incipient magnesium deficiency in, 695.
  - spraying schedules for, N.Mex. 460
- preharvest drop—
  - abnormal, Ohio 313.
  - dust v. liquid applications for prevention, 544.
- production costs, Wash. 738.

Apple(s)—Continued.

- prolonging edible and storage qualities by waxing and prestorage treatments, Md. 314.
- rootstocks, use of Malling and other dwarf varieties, N.H. 312.
- rust fungi control, new concepts in, and spray materials, 695.
- rust fungicides, effect of particle size of sulfur and copper in, 460.
- sawfly new in North America, life history and habits, 577.
- scab—
  - and black rot in Ohio, U.S.D.A. 548.
  - and rust development in New York, U.S.D.A. 548.
  - control, new concepts in, and spray materials, 695.
  - control, spraying experiments, 695.
  - fungicides, effect of particle size of sulfur and copper in, 460.
  - in Maryland, U.S.D.A. 548.
  - in Rhode Island, U.S.D.A. 548.
- sirup, preparation, Mass. 411.
- somatic mutations in, 42.
- sooty blotch and blue mold, N.J., 87.
- spray residue on, relation to pest control, 563.
- spray residue removal from, U.S.D.A. 669.
- spraying requirements, Miss. 215.
- Starking, growth regulators and fruit set with, 669.
- stocks exhibiting noninfectious hairy root and use in bench grafting, 671.
- stocks, hardy, effects, 543.
- storage quality, effects of excess boron, 216.
- sugars in, relation to color and thiocyanate spray, 669.
- tree(s)—
  - 4-year-old, effect of transplanting on yield, Ohio 312.
  - heart rot caused by *Diplodia* sp., 555.
  - in Champlain Valley, response to potash, 68.
  - N, P, and K interrelations in, 28, 215.
  - spraying, lime-sulfur v. flotation sulfur for, 68.
- varieties—
  - comparative recovery following severe freeze of Nov. 1940, 543.
  - descriptions, Mass. 669.
  - effect of rootstocks on nine years' growth and yield, 670.
  - new, 68.
  - storage disorders in, 87.
  - successfully used in top working, 543.
- water core in Illinois, 332.
- Yellow Transparent, development, 543.
- yield per tree, relation to number of fruiting branches, Ohio 672.

- Apricot(s)—
  - blossom blight control with dormant spray, 696.
  - brown rot control, 231.
  - cost of drying, Calif. 386.
  - leaf scorch and dieback, 696.
- Arabogalactan, constitution, 273.
- Araneida on cotton in central Texas, 568.
- Area analysis in northern Sierra Nevada, objectives, 735.
- Arginine hydrolysis by streptococci, 274.
- Arizona Station notes, 270.
- Arizona Station report, 508.
- Arkansas Station notes, 270, 407, 780.
- Arkansas University notes, 270, 407.
- Armadillo, nine-banded, natural infection of Chagas' disease with, 110.
- *Armillaria* root rot of fruit trees, 696.
- Army reservations, mosquito control in, 98.
- Armyworm—
  - parasite in Hawaii, 574.
  - populations in pasture grasses, waste lands, and forage crops, 714.
  - southern, feeding habits and rate of passage of food through gut, 573.
  - southern, susceptibility to calcium arsenate, effect of host plant, 97.
- *Arrhenatherum* to *Axonopus*, host-parasite check-list revision, U.S.D.A. 548.
- Arsenates, composition, relation to action as insecticides and residual poisons, 563.
- Arsenic—
  - determination, micromethod, 6.
  - in organic compounds, determination, 6.
- *Ascaridia galli*, removal from chickens, efficacy of phenothiazine and nicotine-bentonite for, 119.
- Ascarids dissemination by wild rats, 360.
- *Ascaris suum* extract injections, effect on chickens infected with *Ascaridia lineata*, 119.
- *Ascochyta*—
  - *abelmoschi* cause of okra pod spot, 221.
  - blight of pea, control, 693.
  - spp. on *Hibiscus*, 221.
  - spp. on peas, prevention, 81.
- *Ascogaster quadridentatus*, codling moth parasitism by, relation to apple sprays, 707.
- Ascomycetes, unusual type of spermatial fruitbody in, 523.
- Ascorbic acid—*see also* Vitamin C.
  - action of intestinal micro-organisms, 282.
  - determination, photoelectric method for, 626.
  - in adults, renal threshold for, 776.
  - in extracts of sulfited foods, determination, 626.
  - in Florida fruits and vegetables, Fla. 770.
  - in foods in terms of common measures, U.S.D.A. 138.
  - in fruits and vegetables for dietary surveys, 778.
  - in milk, reduced and total, 775.
  - in peppers, N.Mex. 774.
- Ascorbic acid—Continued.
  - in peppers, effect of drying and canning, N.Mex. 503.
  - in potatoes, conservation in cookery, Mont. 615.
  - in quick-frozen broccoli, effect of cooking methods, 403.
  - in small fruits, stability, 402.
  - in snap bean strains, 402.
  - in strawberries and products, Mont. 505.
  - in tomato varieties and species, 140.
  - in turnip greens, effect of fertilizer and environment, 506.
  - in turnip greens, loss from, effect of storage and cooking, Miss. 775.
  - in vegetables, loss from by salting, 609.
  - in walnut hulls, 678.
  - metabolism in horses, 722.
  - metabolism of college students, Tenn. 268.
  - preservation in potato cookery, Mont. 775.
  - progesteronelike action of, evidence against, 103.
  - protection during extraction from plant tissues, 15.
  - requirement of individuals in large institution, 404.
  - retention in apple juice, 614.
  - role in plant nutrition, 34.
  - suitable for use with colored extracts, method for determining, 626.
  - weight-response bio-assay, methods for determining, 12.
- Ash(es)—
  - free from carbon, 160.
  - from foods, decomposition curves, 10.
- Ash rust in New England, 681.
- Asilids, bee-killing, in New England, 576.
- Asparagine—
  - medium, synthetic, growth of phytopathogenic bacteria in, 223.
  - preparation, 147.
  - 1(—)-, reaction of formaldehyde with, 275.
- Asparagus—
  - dehydrated and powdered in several ways, quality, 603.
  - dehydrated, sulfuring, 603.
  - rust control, Wash. 459.
  - rust in Illinois, U.S.D.A. 74.
  - rust, use of copper sprays against, 84.
  - thiamine in, effect of freezing and frozen storage, 400.
- Aspen, tree classification for, 318.
- Arpergillic acid—
  - crude and purified, biological properties, 639.
  - from cultures of an *Aspergillus flavus* strain, 639.
- *Aspergillus*—
  - *fumigatus* and *A. clavatus*, 291.
  - *niger* strain, synthesis of polyphosphate by, 647.
  - sp. of *Candidus* group, bacteriostatic substance from, 33.

Association of Land-Grant Colleges and Universities—
  convention, notice, 144.
  convention, proceedings, 406.
  officers and standing and special committees of, U.S.D.A. 406.
Aster—
  wilt, reduction of, 88.
  yellows virus cause of breaking in color of phlox flowers, 557.
  yellows virus cause of potato purple top wilt, 689.
Astragalus, chromosomes of, 653.
Atmospheric waves and application to weather forecasting, 627.
Atropa belladonna culture, Ohio 316.
Attapulgite, chemical and physical properties, Mo. 409.
Aurantioideae, chromosome numbers in, 653.
Austroicetes cruciata, diapause in eggs of, and effect of temperature on, 463.
Auxin action, mechanism, 188.
Avidin—
  and biotin complex, liberation of biotin from, 624.
  formation, induction in avian oviduct by stilboestrol plus progesterone, 201.
Avitaminosis, *see* Vitamin deficiencies.
Avocado—
  anatomy of fruit, 218.
  blossom buds, differentiation of, 70.
  breeding, 217.
  decline and collapse, relation to injury and death of small roots, 88, 333.
  fruits, woody, 218.
  leaf sap concentration and cold resistance in, 217.
  nitrogen requirement in California, 217.
  orchard soils, handling, 217.
  seed germination, effect of removal of seed coats, 217.
Azalea(s)—
  care of during summer, Miss. 679.
  whitefly in Australia, 464.
Azotobacter—
  carbon monoxide inhibition of, in microrespiration experiments, 295.
  chroococcum relation to accessory growth factors, 295.
  hydrogenase in, action of inhibitors on, 32.
  hydrogenase in, properties, 294.
  metabolism, hydrogen in, 278.
  respiration, apparatus for study, 33.
  respiration rate during nitrogen fixation, effect of O_2 concentrations, 520.
  utilization of xylose and xylan by, 185.
Babesia gibsoni, tick fever due to, 254.
Bacillus—
  abortus, *see Brucella abortus and* Bang's disease.
  brevis submerged cultures, formation of tyrothricin in, 637.
  mesentericus, vitamin synthesis by, 769.
  subtilis isolation from cattle and sheep tissue, 364.
  vulgatus, vitamin synthesis by, 769.
Bacon pig nutrition, value of potato peelings in, 350.
Bacteria—
  autotrophic, metabolism of, 637.
  autotrophic, phosphorylated carbohydrate esters in, 32.
  detergents and staining of, 31.
  growth factors for, 185.
  heat-treated, factors affecting growth, 421.
  heterotrophic, iron requirements, 32.
  in milk and soil, *see* Milk *and* Soil(s).
  internal structure revealed by electron microscope, 421.
  intestinal, vitamin synthesis by, 769.
  logarithmic order of death in, 636.
  nomenclature for, necessity of international system, 421.
  pectin- and lactose-fermenting, gram-negative, non-spore-forming, sanitary significance in water, 279.
  phytopathogenic, growth in synthetic asparagin medium, 223.
  phytopathogenic, names and synonyms since changes in nomenclature, U.S D.A. 74.
  thermoduric, autoclaved slide test for, Mich. 584.
  vegetative cells and spores, spectrochemical analysis, 636.
Bacterial—
  contamination of eating utensils and flat surfaces and effect of disinfectants, 586.
  fermentation and potassium in, 636.
  generic names as common nouns, 31.
  viruses, electron microscope studies, 684.
Bactericides, evaluation, 725.
Bacteriology—
  fundamental principles, 290, 523.
  papers on, 142.
  statistical methods and control in, 636.
  taxonomic research in, value from, 636.
  veterinary, manual, 249.
  veterinary, revision, 358.
Bacteriophage—
  in soils, semiquantitative determinations, 424.
  of *Rhizobium*, isolation and identification, 176.
Bacterium—
  aerogenes, vitamin synthesis by, 769.
  coli, *see Escherichia coli.*
  definition of generic name for certain bacterial plant pathogens, 319.
  salmonicida, trout eggs contaminated with, disinfection, 90.
Badger, American, canine distemper in, 118.
Bagnisiopsis spp. on Melastomaceae, 557.
Bakery products, enrichment, 263.
Bale ties, salvaging, Mo. 492.
Banana—
  leaf spot disease, perithecia production in, soil conditions affecting, 698.
  plants, mercury compounds applied to, 699.

- Banana—Continued.
  - refrigerator cars, empty, fumigation with liquid hydrocyanic acid, 561.
  - varieties, genetic system relation to breeding, 527.
- Bang's disease—*see also* Brucellosis.
  - control, relation to meat and dairy products conservation, 724.
  - immunity tests and new vaccination method, 724.
  - in large dairy herd, 479..
  - modified accredited area, North Carolina as, 724.
  - strain 19 vaccine for permanent control, 726.
- Barium—
  - fluosilicate as zinc arsenite substitute for potato flea beetle control to prevent aphid increases, 340.
  - sulfate, agar-agar as coagulant for, 2.
- Bark beetles—
  - of subfamily *Micracinae*, new genera and species, 241.
  - revision of genus *Phloeosinus*, 95.
- Barley—
  - and wheat varieties in mixtures, survival, 51.
  - brittle rachis in, inheritance, 194.
  - carotene and protein in, at different growth stages, 534.
  - color inheritance in, 39.
  - disease resistance, breeding for, 225.
  - diseases in upper Sacramento Valley, survey, U.S.D.A. 681.
  - embryos, attached and isolated, water in, gaseous exchange, and dry weight, 426.
  - kernel, changes in, during malting, 151.
  - length of dormancy in, relation to after-harvest sprouting, 658.
  - linkage relation between the allelomorphic series B, B^{mb}, B^{g}, and A_ta_t factors in, 39.
  - location of glossy and yellow seedlings in two linkage groups, 39.
  - loose smut fungus, physiologic races of, 225.
  - loose smuts, occurrence, identification, and species validity, 77.
  - Nudihaxtoni variety, inheritance of reduced lateral spikelet appendages in, 39.
  - ovule, fertilization and growth, temperature factor in, 439.
  - possessing extreme dormancy, induced vivipary in, 537.
  - root rot in England, *Rhizoctonia solani* associated with, 687.
  - roots, uptake of zinc and potassium by, effect of type of clay mineral, 174.
  - scab in Ohio, U.S.D.A. 681.
  - scab in Pennsylvania, U.S.D.A. 681.
  - seed-borne molds, smuts, and bacteria, 323.
  - stem rust races, reaction of barley strains and varieties to, 78.
- Barley—Continued.
  - susceptibility to *Fusarium* and *Helminthosporium* kernel blight, 551.
  - Tregal, new variety, N.Dak. 54.
  - varieties—
    - and seeding studies, N.J. 51.
    - effect of temperature change during malting, 23, 151.
    - for Montana, Mont. 439.
    - registered, 205.
  - variety tests, N.Mex. 534.
  - winter, yield tests and descriptions of new varieties, N.C. 54.
  - yields of single plants of varieties and F_2 crosses, distribution, 39.
- Barn(s)—
  - dairy, blackout of, U.S.D.A. 259.
  - dairy, experimental, construction and operation, Ind. 733.
  - dairy, fly control in, 240.
  - dairy, with wartime conservation of metals, U.S.D.A. 379.
  - failures due to wind, causes, 379.
- Base exchange reactions, ionic competition in, 280.
- Bass, largemouthed black, reproduction in ponds, Ala. 90.
- Bat, fruit-eating, parasitization of, P.R.U. 346.
- Bean(s)—*see also* Soybean(s) *and* Velvetbean.
  - beetle, Mexican—
    - control, 237, Tenn. 468.
    - in Florida 241.
  - disease, unusual, 552.
  - enterprises on upland farms, Tenn. 124.
  - fertilizer experiments, Mich. 537.
  - field, income from, Mich. 599.
  - inheritance of hard seed production in, 652.
  - insecticides, war-short, substitutes for, Colo. 406.
  - kidney, culture, P.R.U. 214.
  - leaf beetle control, Tenn. 468.
  - leaf damage, control, Mo. 463.
  - lima—
    - blanched and frozen, ascorbic acid in, Utah 507.
    - field hybridization in, prevention, 42.
    - injury from *Heliothis armigera*, relation to cropping practices, 562.
    - new and old types, changes in specific gravity with increased maturity, 214.
    - origin, dispersal, and variability, Calif. 67.
    - root knot nematode on, in Maryland, U.S.D.A. 681.
  - mosaic-resistant Refugee, productivity, 693.
  - new pest from tropical America, 97.
  - seed treatment with Spergon, effect, 686.
  - snap, ascorbic acid in strains, 402.
  - snap, diseases and injuries in Arkansas, U S D.A. 74.
  - sprouts, preparation and properties, Mich. 411.

- Bean(s)—Continued
    - varieties for Montana, Mont. 439.
    - wax, increase yields with "hormone" insecticide dusts, 310.
    - weevil parasite, laboratory rearing and life history, 346.
- *Beauveria bassiana*, distribution on elm insects, 92.
- Bedbug, fumigants against, tests of chemicals, 709.
- Bee(s)—
    - asilids attacking in New England, 576.
    - colony, morale in, 338.
    - feeding, expeller soybean flour in, Wis. 617.
    - foulbrood, *see* Foulbrood.
    - genera and subgenera, type species of, 241.
    - income from, 577.
    - package, supersedure of queens in, 345.
    - parthenogenetic females in strains, 717
    - skeletomuscular mechanisms of, 99.
- Beef—*see also* Cattle, beef.
    - livers, vitamin A in, 770.
    - production goals, wartime, meeting, Okla. 469.
    - tenderization, chemical changes accompanying, 18.
- Beekeepers, hints to, Miss. 510.
- Beekeeping, nosema disease in, Wis. 617.
- Beet(s)—
    - and beet greens, dehydrated, methods of drying, storage, and cooking, R.I. 396.
    - boron deficiency in, 84.
    - effect of boron deficiency on histology, 84.
    - leafhopper, field-control program, evaluation, 710.
    - leafhopper, weed hosts, ecology of, in San Joaquin Valley, U.S.D.A. 464.
    - roots, normal and crown gall tissue in, differential inhibition between, 691.
    - seed, sheared, treatment of, 691.
    - sugar, *see* Sugar beet(s).
    - table, culture, U.S.D.A. 666.
- Beetles—
    - dermestid, classification, U.S.D.A. 344.
    - West Indian, monograph, 95.
- Belladonna—
    - culture, Ohio 316.
    - damping-off due to *Pythium* spp. 702.
    - *Phytophthora* rot, studies, 702.
    - studies, Wis. 617.
- Bentgrass, Piper velvet, seed yields, relation to fertilizers, 64.
- Bermuda grass, coastal, description, Ga. Coastal Plain 439.
- Berries, *see* Fruit(s), small, *and* Raspberry(ies), Strawberry(ies), *etc.*
- Bibliography of—
    - agricultural labor in United States, July 1941–February 1943, U.S.D.A. 744.
    - agriculture, 512.
    - biochemical methods, 1.
    - boron as plant nutrient, 645.
    - brucellosis in man and animals, 586.
    - chlorates, herbicidal action, U.S.D.A. 213.
- Bibliography of—Continued.
    - farmers, subsistence, war relocation, 743.
    - foulbrood diseases of bees, 338.
    - Hemiptera-Heteroptera, British, 707.
    - holly leaf miner, 466.
    - hop downy mildew, N.Y.State 330.
    - lice and man in wartime, U.S.D.A. 710.
    - meteorology and related subjects, 627.
    - *Microcycas calocoma*, 193.
    - mosquitoes of Utah, 239.
    - northern Great Plains, 739.
    - *Nysius* genus and allies in Hawaii, 94.
    - parasitology, 237.
    - partridge, Hungarian, 560.
    - phycomycetes, 422.
    - pine, ponderosa, 193.
    - poultry, Kans. 350.
    - poultry diseases, 119.
    - rabbit as used in disease research, 369.
    - rationing, U.S.D.A. 261.
    - rickettsiae, pathogenic, nomenclature, 587.
    - rubber-producing plants, other than *Hevea*, Tex. 678.
    - *Salmonella* problem, 588.
    - *Salmonella* spp., nutritional requirements, 113.
    - sheep, nutrition of, 349.
    - sunflower diseases, 692.
    - swine influenza, 366.
    - virus diseases, 319.
    - water supply of upper Columbia River Basin, 731.
    - woodpecker, ivory-billed, 561.
- Bindweed—
    - eradication in Nebraska, Nebr. 666.
    - root system, nature and rate of development, 194.
- Bio-assay—
    - determination of L. D. 50 and sampling error in, 510.
    - on general curve, 510.
- Biochemical methods, bibliography of, 1.
- Biochemistry—
    - annual review, 754.
    - textbook, 621.
- Biological—
    - oxidations and reductions, 754.
    - specimens, mounting and clearing, polyvinyl alcohol as medium, 412.
- Biology, the science of life, treatise, 461.
- Biotin—
    - and avidin complex, liberation of biotin from, 624.
    - chemistry and biochemistry, 147.
    - deficiency in rats, 504.
    - deficiency in rats, acute, pathological studies, 505.
    - in diet, relation to output in urine and feces, 773.
    - intestinal synthesis in rat, 773.
    - metabolism in man, 772.
    - peroxide-treated, response of bacteria, yeast, and rats to, 773.
- Birch borer, bronzed, damage by, in Maine, 716.

- Bird(s) —
  - attracting, 704.
  - body weight, effect of different amounts of illumination, 46.
  - from Georgia, relative incidence of blood parasites in, 254.
  - game, breeders, publications of interest to, 704.
  - game, gallinaceous, propagation and management, 704.
  - in Southwest, blood parasites in, 592.
  - malaria in southern New Jersey, 98.
  - migratory game, status, 704.
  - nesting, and vegetation substrate, 706.
  - North Carolina, 559.
  - preservation, international treaties and agreements for, 89.
  - seed-eating, winter food productivity of agricultural land for, 89.
  - study, aids for, 704.
- Bittersweet injury to young trees, 703.
- Black Hills beetle outbreaks, relation to tree growth, 345.
- Black scale—
  - fumigation experiments, 238.
  - parasites v. Argentine ant, 99.
- Blackberry breeding, production of tetraploids in, 654.
- Blackleg in sheep, outbreaks in Colorado, 727.
- Blackout of poultry houses and dairy barns, U.S.D.A. 259.
- *Blapstinus* spp. damage to strawberry fruit, 337.
- *Blastomyces* isolated from a dog, 112.
- *Blatta orientalis*, *see* Cockroach, oriental.
- *Blattella germanica*, *see* Cockroach, German.
- Blattidae of Texas, 93.
- *Blissus mixtus*, notes, 464.
- Blister beetles, toad as enemy of, 706.
- Blood—
  - cells and plasma, nicotinic acid in, determination, 11.
  - corpuscles of dove species and their hybrid, pictorial representation of antigens, 47.
  - donors, dietary recommendations for, 612.
  - ewes', ascorbic acid in and effect of ascorbic acid injections, 104.
  - films, stained, use of darkfield illumination for study, 286.
  - in packing-house byproducts, determination, 9.
  - iron from, absorption of, 769.
  - of school children, hemoglobin content, S.C. 613.
  - regeneration, nutrition in, 612.
  - serum of cows, staphylococcal antitoxin in, 727.
  - smears for laboratory study, preparation, 704.
- Blowfly, sheep—
  - of Great Britain, survey, 467.
  - studies, 562.
- Blue grama and buffalo grass, comparison of carotene, protein, Ca, and P in, 52.
- Blueberry—
  - culture, essentials of, Mich. 675.
  - disease in Maine and control, Me. 697.
  - highbush, yield and size of fruit, effect of manure, Mich. 544.
  - production in the garden, N.J. 315.
  - storage, Me. 70.
- Bluecomb of fowls, relation to wheat feeding, 486.
- Bluegrass—
  - Kentucky—
    - anther color in, effect of nitrogen, 538.
    - cut at different seasons, composition, Ky. 281.
    - floret and seed types, relation to yield and quality of seed, 55.
    - growth and chemical composition, seasonal variations in, Mo. 537.
    - lawns, weed control in, selective sprays for, Mont. 308.
    - leaf disease, 552.
  - pasture, root distribution, factors affecting, 53.
  - role in soil conservation and fertility, 175.
  - stripe smut, prevalence and economic importance, U.S.D.A. 74.
- Bobwhite, *see* Quail.
- Bogs of northern lower Michigan, 524.
- *Bohmiella wilsoni* from stomachs of American squirrels, 236.
- Boll weevil—
  - control, time of poison application, Miss. 468.
  - in cottonfields, factors affecting, 345.
  - infestation, effect on cotton plant, Miss. 717.
- Bollworm—
  - insecticide tests and variations in schedules for, 339.
  - pink, host plants in Texas and Mexico, 706.
- Bone regeneration in rats, effect of ascorbic acid, calcium ascorbate, and calcium gluconate, 776.
- Bones of mice, breaking strength, effect of sex and sex hormones, 103.
- Books on—
  - aging, problems of, 335.
  - animal breeding plans, 42.
  - animal diseases, infectious, 358.
  - bacteriology, 523.
  - bacteriology, fundamental principles, 290.
  - bacteriology, veterinary, 249.
  - bacteriology, veterinary, revision, 358.
  - biochemistry, 621.
  - biology, 461.
  - botany, 523, 635.
  - butterflies and moths of America, 465.
  - canning, home, including preserving, pickling, dehydration, and jelly-making, 501.
  - cellulose chemistry, 17.
  - citrus culture, tropical, 677.

Books on—Continued.
  climate and weather, 413.
  climatology, 413.
  dairy chemistry, Richmond's, revised, 723.
  ducks, wild, 336.
  electron microscope, 2.
  experimental data, treatment of, 779.
  food and planning, 498.
  food, freezing preservation, 133.
  food, health, and vitamins, 262.
  food poisoning, 764.
  food production and consumption, 392.
  food we eat, nutritional content, 131.
  genetics, principles, 38.
  geography, economic, 131.
  grasses, sedges, and rushes, British, 658.
  meteorology, 166, 413.
  microscope, electron, 2.
  milk and milk products, 584.
  mycology, industrial, 523.
  nutrition and physical fitness, 764.
  parasitology, 237.
  parasitology, medical, 477.
  plant geography, historical, 293.
  plant mineral deficiencies, diagnosis, 681.
  plant pathology, 74, 548.
  plant tissue culture, 643.
  poultry diseases, 369.
  poultry farming, commercial, 722.
  poultry keeping, backyard, 579.
  proteins, electrophoresis, and chemistry of living cells, 15.
  rabbit raising for food and fur, 722.
  sheep, 349.
  sheep, Karakul, 721.
  soil mechanics, theoretical, 517.
  soil science, 517.
  soils, nature and properties, 517.
  textiles, 615.
  timbers of New World, 679.
  voles, mice, and lemmings, 336.
  weather and climate, 413.
  wildlife refuges, 461.
  zoology, 89.
Boophilus annulatus, see Tick, cattle.
Bordeaux mixture—
  physical characteristics, relation to quality, 321.
  standard laboratory, preparation and use, 452.
Boron—
  as plant nutrient, bibliography, 645.
  fixation in soil, possible mechanisms, 184.
Botanical study outline for secondary and preparatory schools in Mexico, 523.
Botany—
  general, new viewpoints and scientific concepts in, 635.
  invitation to, treatise, 635.
  textbook, 523.
Botfly larvae infesting domestic animals in New York State, key, 99.
Botrytis disease of lupines, 227.
Botulinus toxin, detection in blood stream of wild ducks, 254.
Boxelder bug, *Herpetomonas leptocoridis* in alimentary canal of, 94.
Brain, proteinase in, studies, 148.
Brazil, geographical aspects of, in regard to climate, land, and man, 167.
Bread(s)—*see also* Flour.
  enriched, thiamine in, calculated blank for estimating, 12.
  thiamine in, and stability of vitamin B_1 during bread making, 624.
  whole-meal and white, comparative digestibility and effect of degree of fineness of grinding, 756.
Bream, bluegill, reproduction in ponds, Ala. 90.
Breeding, *see* Plant breeding, *and specific animals and plants.*
Briquette fertilizers, preparation, use, and effect on plants, 522.
Broccoli—
  dehydrated, sulfuring, 603.
  mosaic disease, 329.
  mosaic, spread and effect in the field, 329.
  quick-frozen, ascorbic acid in, effect of cooking methods, 403.
Bromegrass—
  and bromegrass mixtures, culture and utilization, Ill. 660.
  growth inhibiting effect of dead roots, 55.
  roots, relation to drought resistance, 661.
  seed germination studies, 307.
  toxicity v. N starvation, 55.
  winter survival in fall sown plats, 659.
Bromine, organic, quantitative decomposition by lime-fusion method, 6.
Brooder(s)—
  electric, home-made, Ohio 259, Oreg. 379.
  iron wire, for wartime, Wash. 259.
  new electric lamp, N.J. 380.
Broomcorn production, disease threatening, U.S.D.A. 74.
Broomrape parasitizing tomato plants, 87.
Broomsedge lands, reclaiming, trash mulch method with alfalfa, Ohio 659.
Brucella abortus—see also Bang's disease.
  activity of streptothricin against, 359.
  and microbial antagonism, 479.
  organisms, number required to infect guinea pigs and catle, 359.
  virulence, for guinea pig and cow, 479.
Brucellosis—
  in man and animals, 586.
  in swine, 724.
  in swine breeding herd, Idaho 590.
  in swine, interpretation of low titer reactions in, 366.
  studies in, Mich. 477.
Bryobia praetiosa, see Clover mite.
Buffalo grass and blue grama, comparison of carotene, protein, Ca, and P in, 52.

Bull(s)—*see also* Sires.
  dairy, efficiency, graphic method of showing, 42.
  dairy, respiratory activity of spermatozoa, Mo. 437.
  infected with *Trichomonas foetus*, distribution in preputial cavity, 362.
  semen, seasonal variation in, 530.
  semen, spermatozoa in, methods for estimating number, 48.
  steer progeny of, variations in occurrence of bloat in, 655.
Bumble bees visiting red clover, numbers and species, 707.
Bunostomum trigonocephalum preparasitic stages, overwinter survival on pasture, 366.
Bunt, *see* Wheat smut, stinking.
Buprestis aurulenta, delayed emergence from structural timbers, 562.
Bureau of Entomology and Plant Quarantine, report, 141.
Burrillia anomala n.sp., description, new in Canada, 77.
Butter—
  and butter making, chemistry of, Iowa 623.
  cultures, bacteriology, 111.
  making during hay feeding season, Oreg 357.
  making, selecting cream for, to meet Government mold standards, Mont. 724.
  manufacturing plants, water supplies of, bacterial contet, Iowa 585.
  mycelia count, factors affecting, Ark 585.
  pH of, methods of determining with standardized acidity, Iowa 623.
  storage, showing surface deterioration, studies, 248.
  substitutes, report by New York Academy of Medicine, 758.
Butterfat—
  and vegetable oils, comparative nutritive value, 758, 759.
  concentration rate in fresh milk during cooling, 475.
  degree of solidification, measurement, 110.
  digestive coefficients, 759.
  growth-promoting value. 758, 759.
Butterflies and moths, American, 465.
Buttermilk, cultured, manufacture, Fla. 477.
Cabbage—
  dehydrated, methods of drying, storage, and cooking, R.I. 397.
  dehydrated, sulfuring, 603.
  effect of boron deficiency on histology, 84.
  F_1 colchicine-induced tetraploid, compared with its diploid progenitor, 654.
  raw, ascorbic acid in, availability for human nutrition, 404.
  tissue fluid, oxidation-reduction potentials of, 36.
  worm injury, prevention, Mo. 463.
Cacao—
  butter digestive coefficients, 759.
  products, poisoning of livestock by, 361.
  swollen shoot virus disease, control, 699.
  wilt of fruits, causes, 460.
  witches' broom disease, introduction, symptoms, and etiology, 88.
Cactus—
  pricklypear, biological control in Australia, 96.
  spineless, as feed for sheep, 719.
Caesalpinia coriaria as source of tannin, U.S.D.A. 679.
Calcium—
  absorption, effect of lactose and its hydrolysis products, 137.
  arsenates composed of large and of small particles, relative effectiveness, 339.
  ascorbate, effect on bone regeneration in rats, 776.
  deficiency and gastric lesions in rat, 768.
  in Chinese dietary, 756.
  in limestone, accurate determination, 160.
  in peanut butter, 395.
  in soil, 183.
  level in diet of rat, effect of varying on growth and well-being, Mo. 502.
  metabolism, regulation, relation of endocrine system to, Mo. 435.
  purified compounds, preparation, 513.
  silicate slag, quenched, as substitute for limestone and superphosphate, 634, Tenn. 420.
Calf(ves)—
  dairy, feeding milk to, nurse cow v. artificial methods, S.C. 617.
  dairy, raising on dry meal, Mont. 353.
  feeding on whole milk and skim milk, Del. 474.
  management for promoting good growth, N.Dak. 348.
  scours, prevention and treatment with sulfasuxidine succinylsulfathiazole, 253.
  war emergency plans for raising, 247.
Calfhood vaccination in New York, 724.
California Station notes, 780.
California University notes, 780.
Camellias, care of during summer, Miss. 679.
Canned foods, *see* Food(s), canned.
Canning—
  commercial, and dehydration processes, comparison, 602.
  crops, vegetable, fertilizing, N.Y.State and Cornell 309.
  home, including preserving, pickling, dehydration, and jelly-making, 501.
  technology, 263.
Cantaloup, *see* Muskmelons.
Capnodium spp., coffee disease due to, 700.
Capon production, Kans. 579.
Caprifig, mosaic spots of, 556.
Carbohydrate(s)—
  biological oxidation, intermediary stages in, 147.
  chemistry of, 755.

Carbohydrate(s)—Continued.
  fate in the rumen of sheep, 349.
  metabolism, 755.
  metabolism, mechanisms, 147.
Carbon(s)—
  in plant tissue extracts, determination method, 7.
  semimicrodetermination, using Van Slyke-Folch oxidation mixture, 7.
  spectrographic, purification, 18.
  tetrachloride effect on toxic efficiency of volatile organic compounds, 568.
Carnation—
  bacterial wilt on coast and in Midwest, 700.
  diseases transmitted by cuttings, 700.
  Fusarium wilt symptoms, [N.Y.]Cornell 233.
  mosaic, studies, 700.
Carneocephala fulgida vector of grapevine Pierce's disease, Calif. 698.
Carotene—
  in peppers, N.Mex. 774.
  in peppers, effect of drying and canning, N.Mex. 503.
  in plant tissue, 13.
  in urea-treated sorghum silage, Miss. 471.
  in vegetable wastes, 139.
  in vegetables, loss from by salting, 609.
  oxidation, relation to enzymic peroxidation of unsaturated fats, 146.
  studies, 14.
Carotenoid(s)—
  in eggs, spectroscopic studies, Ind. 770.
  pigments, bacterial, isolation and absorption spectrum maxima, 279.
Carpenter bee, mountain, nests, dried fruit moth breeding in, 338.
Carpocapsa pomonella, see Codling moth.
Carrot(s)—
  dehydrated and powdered in several ways, quality, 603.
  dehydrated, sulfuring, 603.
  experiments at Conservancy District Substation, N.Mex. 214.
  rust fly, biology and control, 574.
  seed production experiments, N.Mex. 666.
  seedling blight and black rot, control, 230.
Carver, G. W., life and work, 510.
Carya, nomenclature, 186.
Casein in skim milk, refractometric determination, 7.
Castor-bean(s)—
  an industrial war crop, 440.
  characteristics, importance, and current status, 307.
  production and processing, 376.
  stem blight, 555.
  varieties, yields, 307.
Cat(s)—
  Burmese, genetics of, 433.
  prenatal growth, 306.
  reactions to hot atmospheres, 242.
Cat(s)—Continued.
  weight of heart in fetal and adult stage, 306.
Catalase—
  activity of *Brucella* spp. as criterion of virulence, 479.
  determination, simplified apparatus for, 159.
Catorhintha mendica, bionomics, 94.
Cattle—*see also* Calf(ves), Cow(s), Heifers, Livestock, *and* Steers.
  beef—
    and dual-purpose, muscle-bone ratio as index of merit, 104.
    effect of crossbreeding, N.Dak., 43.
    effect of ration on rate and cost of gains and on quality of beef produced, S. C. 617.
    feeding experiments, Ga. 719.
    home butchering, economy of, 718.
    hybrid, for subtropical climates, U.S.D.A. 301.
    management, N.J. 578.
  blood, cellular antigens in, 198.
  blood serum *Streptococcus agalactiae* agglutinins in, 116.
  breeds, development for tropical conditions, U.S.D.A. 432.
  congenital hereditary eye defect of, 431.
  crosses, gene interactions in, 43.
  dairy—*see also* Cow(s).
    artificial insemination of, Ohio 655.
    breeding and improvement, 43.
    conception rate, by artificial insemination at various stages of oestrus, Nebr. 436.
    costs and returns in northwestern Indiana, Ind. 737.
    feeding, 354.
    fly repellents for, tests, 344.
    persistence of lactation in, genetic aspects, 431.
    persistence of lactation in, measurement, 431.
  effect of sulfathiazole, 363.
  fattening, good pasture and roughage, for, Mo. 470.
  fattening, protein supplements for, Nebr. 470.
  feeding as method of marketing alfalfa on irrigated farms, N.Mex. 737.
  feeding experiments, Md. 469.
  feeding stuffs, determinators of metabolizable energy, 718.
  fly-repellency tests, technic for conducting, 344.
  grubs, control method, 724.
  Jersey, bowed pastern in, 43.
  Jersey, twinning in, unusual case, 301.
  of Argentina, U.S.D.A. 142.
  poisoning, *see* Livestock poisoning, Plant(s), poisonous, *and specific animals and plants.*
  protein feeding in wartime to, Okla. 718.
  stocker, soybean hay for, late-cut v. early-cut, Ky. 243.
  ticks, *see* Tick(s).

- *Cattleya* and allied genera, growth of fruits in, 426.
- Cauliflower, dehydrated, sulfuring, 603.
- Cavies, publications on, 704.
- Cedar—
  - heartwood extracts, effect on wood-decaying fungi in culture, 334.
  - rust, *see* Apple rust.
  - southern white, successional role of, 220.
- *Cedrela fissilis*, cuticular transpiration in, methods of study, 643.
- Celery—
  - fly, larval stages, and associated parasitic yeastlike fungus, 241.
  - insect control on, 91.
  - petioles, cracking, due to boron deficiency, 230.
  - planter modified to transplant forest seedlings, description, 545.
  - yield, reduction in, caused by root knot nematode, U.S.D.A. 681.
- Cell—*see also* Plant cells.
  - lineage studies in root meristems by chromosome rearrangements induced by X-rays, 197.
  - physiology and cytology, 284, 621.
- Cellular nuclei, nature of proteins of, 147.
- Cellulose—
  - chemistry, introduction to, 17.
  - digestion by protozoa in rumen of cattle 347, 348.
- *Celtis* leaf spot disease in Palestine, 558.
- Centipedes, Mexican, 100.
- *Cephalosporium*—
  - *luteum* n.sp., description, 89.
  - *pallidum* n.sp., description, 89.
  - wilt of persimmon, U.S.D A. 319.
- *Cephenomyia jellisoni* parasite of Columbian black-tailed deer, life history and morphology, 575.
- *Ceratostomella* spp. and pseudopyridoxine, 641.
- *Cercospora*—
  - *coffeicola*, coffee disease due to, 700.
  - leaf spot of tobacco, varietal resistance, 327.
  - *morindicola* n sp., description, 702.
  - spp. of Venezuela and hosts, 682.
- Cereal(s)—*see also* Grain *and specific grains.*
  - boron content, 428.
  - crops in Saskatchewan, tolerance of salinity by, 51.
  - diseases in Kansas, 319.
  - length of dormancy in, relation to after-harvest sprouting, 658.
  - rust, *see* Rust(s) *and specific hosts.*
  - seed treatment, *see* Seed treatment.
  - smut, *see* Smuts *and specific hosts.*
- *Cerotoma trifurcata*, *see* Bean leaf beetle.
- *Ceroxylon ferrugineum* studies, 34.
- *Chabertia ovina*, hemolytic substance in, tests for, 114.
- Chafer, European, life history, 562.
- Chagas' disease in Texas, reservoir hosts, 119.
- *Chaoborus astictopus*, *see* Gnat, Clear Lake.
- Cheese—
  - Cheddar, rancidity studies in Canada, 476.
  - Cheddar, ripened in tin cans, gas production by, N.Y State 111.
  - cottage, commercially made, calcium and phosphorus in, 358.
  - cottage, home and factory manufacture, Mich. 358.
  - cottage, manufacture, Fla. 477.
  - Limburger, ripened in tin cans, gas production by, N.Y.State 111.
  - Limburger, surface flora and use of pure cultures in manufacture, N.Y.State 476.
  - made from milk of varying acidity and from pasturized milk, properties and quality, 111.
  - making, problem of bacteriophage in, 111.
  - new types, Savoureux, 357.
  - ripening, action of enzyme preparation from chicken proventriculi, 357.
  - Romano type, use of rennet paste in making, 477.
  - Roquefort type, vitamin A value, 138.
  - soft, home preparation, Wash. 477.
- Cherry(ies)—
  - bacterial canker organism, laboratory tests of bactericides on, 460.
  - brown rot control, 231.
  - decay under simulated transit conditions, effect of CO_2 and temperature, 231.
  - dehydration, 397.
  - diseases in Ozark section of Arkansas, U.S.D.A. 74.
  - fruitfly, host relations, 91.
  - grease spot disease, 696.
  - leaf spot control experiments, results, 697.
  - leaf spot, variables in control of, 332.
  - Montmorency, permanence of strain and other differences in, Mich. 674.
  - preharvest sprays for, organic materials in, 556.
  - rasp leaf, 460.
  - seedlings, mazzard, with excessive roots at collar region, studies, 556.
  - sour, destructive virus disease of, 332.
  - spray residue removal from, U.S.D.A. 669.
  - varieties, plant characters of, Mass. 314.
- Chestnut, European, ink disease control, new method, 703.
- Chick(s)—
  - ascorbic acid-gonadotropic hormone relations in, 46.
  - cholic acid formation in, relation to milk, cholesterol and oestrogens, 580.
  - distillers' dried solubles as vitamin supplement in rations, 580.
  - embryo(s)—
    - dominant rumplessness in, development, 46.
    - homozygous for creeper factor identification, 200.
    - infection with vesicular stomatitis virus, factors affecting, 593.

Chick(s)—Continued.
- embryo(s)—continued.
  - rumplessness, produced by mechanical shaking of eggs prior to incubation, 532.
  - synergistic action of *Hemophilus influenzae suis* and swine influenza virus, 590.
  - transplantation of limb buds and innervated grafts in, 532.
- embryonic tissues, isolated, differentiation in respiratory activity, 529.
- feather pigmentation in, unidentified nutritional factor required by, 245.
- growth, effect of thyroactive iodocasein on, 351.
- growth, essential factor in oat hulls for, Iowa, 473.
- Korean lespedeza seed as protein supplement in ration, Mo. 472.
- lespedeza as source of riboflavin for, S.C. 617.
- maintained on heated diet, factors required by, 107.
- management for promoting good growth, N.Dak. 348.
- of standard breeds, sight sexing, N.J. 303.
- oviduct response to oestradiol doses, 531.
- phosphorus supplement for, amorphous calcium metaphosphate as, 581.
- pyridoxine deficiency in, 107.
- raising, N.Dak. 510.
- rations, purified, effect of added cystine in, 579.
- rations, whey solubles as source of growth factors in, 352.
- shank pigmentation, 245.
- slipped tendon in, *see* Perosis.
- unidentified water-soluble vitamins necessary for, 580.
- yellow pigmentation in shanks, increasing, 351.

Chicken(s)—*see also* Chick(s), Fowl(s), Hens, Poultry, *etc.*
- broiler(s)—
  - dehydrated ground clovers and perennial grasses v. sun-cured alfalfa-leaf in rations, Del. 723.
  - industry in Maryland, Md. 386.
  - production, selecting breeding stock for, U.S.D.A. 303.
  - production with high-protein feeds, Miss. 353.
- cut-up, proportions and prices, relation, 246.
- fat, green pigment in, 246.

Chiggers, American—
- new genus, *Acariscus*, 100.
- taxonomy and descriptions of new genera and species, 100.

Children—
- appearance of ossification centers in, 768.
- dietary status in rural and urban schools of Virginia, Va. 266.

Children—Continued.
- nutritional status, effect of good school lunch, S.C. 612.
- preschool, on medium and high-protein diets, potassium, sodium, and chlorine balances, 137.
- school—
  - diets consumed by, adequacy, La. 264.
  - hemoglobin content of blood, S.C. 613.
  - nutritional status, Ariz. 502.
  - rural and urban of Utah, nutritional status indices for, 265.
- sulfur metabolism of, 137.

Chinch bug—
- false, bird predators in Utah, 562.
- sand dune, notes, 464.

Chlorates, herbicidal action, soil conditions affecting, U.S.D.A. 213.

Chlorella—
- photosynthesis, quantum yield, dependence on wave length of light, 208.
- *vulgaris*, respiration in, effect of culture filtrates, 193.

Chloride, potassium, sodium, and simultaneous determination, in single tissue or blood sample, 166.

Chlorochroa sayi, *see* Stinkbug, Say.

Chlorophyll(s)—
- *a* and *b*, absorption spectra, effects of solvent, 648.
- *a* and *b*, analysis of plant extracts for, 161.
- *a* and *b*, photo-oxidation of, 298.
- absorption spectra, interlaboratory comparison, 161.
- and photosynthesis, 31.
- and protein complex, 191.
- in chloroplast, state of, 37.
- in plant tissue, 13.

Chloropicrin as soil disinfectant, rate of escape, effect of soil type and temperature, Ohio 26.

Chlorosis—
- in *Chlorella* under conditions of sulfur deficiency, 682.
- in ornamental shrubs, Utah 71.
- in Sudan grass, 456.
- in tomatoes, 231.

Chocolate milk, Minnesota Babcock method applied to, 623.

Cholic acid formation in chicks, relation to milk, cholesterol and oestrogens, 580.

Choline requirements of rats, inherited differences in, 528.

Chortoicetes terminifera—
- outbreaks, 1937–39, analysis, 93.
- studies, 562.

Chromosomal aberrations induced by X-ray radiation, effect of colchicine pretreatment, 650.

Chromosome(s)—
- aberrations, growth changes associated with, 652.
- and nucleoproteins, 147.

Chromosome(s)—Continued.
- fusion of broken ends following nuclear fusion, 40.
- meiotic prophase, behavior in high temperatures, 653.
- number and phylogenetic relations in spurge family, 653.
- numbers in Aurantioideae, 653.
- of *Astragalus*, 653.
- prophase pollen tube, differential sensitivity to [illegible]-rays and ultraviolet radiation, 649.
- rearrangements, X-ray-induced, cell-lineage studies in root meristems by, 197.
- study advantages of pretreatment of young leaves with dilute colchicine, 285.

Chrysanthemum *Verticillium* wilt and *Septoria* leaf spot, 233.

Church—
- attendance in Aurora Co. and problem of over-churched and under-churched areas, S.Dak. 391.
- call and challenge, Va. 262.

Cicada killer in Ohio, life history and habits, 100.

Cicadella circellata vector of grapevine Pierce's disease, Calif. 698.

Cimex lectularius, *see* Bedbug.

Cinchona seed, fresh, quinine from, U.S.D.A. 544.

Cirphis unipuncta, *see* Armyworm.

Cirrhosis—
- hepatic, and choline, 361.
- liver, from chronic poisoning with carbon tetrachloride, action of sulfanilamide against, 361.

Citrus—
- brown rot, tetrachloro-*p*-benzoquinone for control, 322.
- chromosome numbers in, 653.
- convex gum, new disease in China, 334.
- cooperatives, trends in financial structure and success of, Fla. 747.
- culture, tropical, manual, 677.
- decline and collapse, relation to injury and death of small roots, 88, 333.
- fruit(s)—*see also specific kinds.*
  - color development in, relation to climatic conditions, 168.
  - ridging, fumigation with hydrocyanic acid gas as factor, 315.
- fungal infections, relation to nutrition, 83.
- groves, termites in, 93.
- leaves, physiological disturbance in, causes of mesophyll collapse, 333.
- magnesium deficiency in, early diagnosis, 232.
- market diseases of, U.S.D.A. 556.
- nutrition, relation to potash, 699.
- pests in Windward and Leeward Islands, 563.
- root rot control, 699.
- root rot studies, 334.
- roots, anatomy, osmotic pressure, and periodicity of growth, 526.

Citrus—Continued.
- S-dusted fruit, effect of temperature on damage from, 699.
- susceptibility of *Phytophthora citrophthora*, 699.
- thrips control, present status, 237, 340.
- thrips feeding pattern recorded, 706.
- thrips, resistance to tartar emetic treatment, 93.
- waste press juice, feed yeast and industrial alcohol from, 158.
- woods, chemical constituents, 157.

Clay—
- colloidal, and roots, surface relations in plant nutrition, 172.
- loam, Palouse silty, exchangeable cation status and structure, 179.
- minerals—
  - chemical and physical properties, Mo. 409.
  - effect of type on uptake of zinc and potassium by barley roots, 174.
  - electron micrographs of, 173.
  - of montmorillonite group, relations, 173.
- pan soils, aggregation, factors affecting, 414.
- zinc montmorillonite, cation and anion interchange with, 635.

Clemson College notes, 272.

Climate(s)—*see also* Meteorology.
- American, effect of ocean and gulf, analysis of charts, 628.
- and weather, introduction to study, 413.
- and weather of Kansas, Kans. 25.
- classification, new method, 288.
- classification, problems in, 413.
- of Palouse area of Idaho, Idaho 629.

Climatological—
- data, 25, 289, 517.
- regions of Mexico, map of, 167.
- survey for Ohio and Wooster, Ohio 629.

Climatology—
- physical, fundamentals of, 166.
- textbook, 413.

Clostridium chauvoei infection in sheep, 727.

Clothing—
- infested with body lice, methods and equipment for fumigation, 710.
- planning for farm family, Miss. 268.

Clover—
- bur, seed, deterioration under irrigated conditions, 55.
- cost of production on different soil types, Ind. 124.
- crimson, in Coastal Plain of Southeast, 55.
- crimson, varieties and seeding studies, N.J. 51.
- fungi affecting, U.S.D.A. 686.
- Ladino, pasture returns from, Mich. 538.
- leafhopper and potato yellow-dwarf virus, relation, 327.
- leafhopper, transmission of potato yellow-dwarf virus by, genetic variation in, 690.

Clover—Continued.
  mite, notes, 242.
  Persian, description, needs, and uses, U.S.D.A. 56.
  red, as silage and hay, conservation of nutrients, Vt. 468.
  red, varieties and seeding studies, N.J. 51.
  seed crop needed to supply war scarcity, Miss. 439.
  seed yield, effect of clipping treatment and rolling, 56.
  varieties for Montana, Mont. 439.
  white, cyanogenetic glucoside and its hydrolyzing enzyme, inheritance of, 652.
  white, evaluation of individual plants for yielding ability with bluegrass, 56.
  white, leaves, composition, effect of rust and sulfur, 324.
  white, stem nematode on, 323.
Clubroot, resistance of crucifers to, relation to mustard oils in, 686.
Coacervates—
  in plant cells, 34.
  production of, 550.
Coal mining, strip, effect on agriculture and land use, 735.
Cocci, gram-negative, effect of bactericidal agents on, 115.
Coccidia, swine—
  effect of moderately low temperatures on sporulation of oocysts, 118.
  oocysts of two species, survival on soil, 118.
Coccidiosis—
  a menace to fox and mink, 729.
  bovine, sulfaguanidine in treatment, 363.
  cecal, resistance of chickens to, 592.
  cecal, sulfaguanidine for, 361.
  cecal, susceptibility of chickens to, 119.
  in chicks, sulfur and sulfaguanidine for control, 371.
  of lambs, sulfaguanidine in control, 484.
Coccinellidae of the Koebele collection, 468.
Cochliomyia spp., *see* Screwworm(s).
Cockerels—
  estimation of size of comb, 433.
  fattening, by stilboestrol administration, 245.
  semen production in, seasonal variation, 202.
Cockroach(es)—
  American, muscular activity, effects of pH and concentrations of sodium, potassium, and calcium chloride, 708.
  brown-banded, new pest in Utah, 562.
  control, Nebr. 93.
  German, control, sodium fluoride crayons for, 340.
  oriental, isolation of *Staphylococcus albus* from hemolymph of, 93.
  pyrethrum aerosol tests against, 707.
Coconut oil digestive coefficients, 759.
Codling moth—
  bait, standard, chemotropic tests of materials added, 713.
Codling moth—Continued.
  control, Mo. 467.
  control, combination sprays for, 91.
  control, lead arsenate and tricalcium arsenate combinations for, 572.
  control, newer insecticides for, tests, 342.
  control programs, 97.
  control, rotenone and other organic insecticides for, 713.
  control, tests of Mississippi bentonites in sprays for, 561.
  deposit-building sprays for, 342.
  development, effects of nutrition on, 239.
  dusting experiments with natural cryolite for, 562.
  emergence, relation to bait-trap catches and egg laying, 91.
  in Williams' pears, life history, bionomics, and control, 343.
  larvae, newly hatched, effect of insecticides, relation to changes in relative humidity, 337.
  oviposition and fate of eggs, 342.
  parasitism by *Ascogaster quadridentatus*, relation to apple sprays, 707.
  sprays, use of attractants in, 238.
  tests of N-substituted *p*-bromobenzenesulfonamides against, 706.
  trapping methods, effect on proportion of females in catches, 337.
  xanthone as ovicide and larvicide for, 713.
Cod-liver oil and oleovitamin A and D, comparative stability of vitamin A in, 138.
Coenzymes, application of absorption spectra to study, 13.
Coffee—
  diseases, studies, 700.
  growth and yield, effect of solar radiation intensity, P.R.U. 316.
Colchicine-Feulgen leaf smears value in chromosome study, 285.
Coleophora malivorella, *see* Pistol casebearer.
Coleus, riboflavin in, 296.
College students, ascorbic acid metabolism, Tenn. 268.
Colletotrichum—
  falcatum deterioration in culture, 683.
  graminicolum (?) threatening broomcorn production, U.S.D.A. 74.
Colloid(s)—
  complex of soil, K in and plant nutrition, 29.
  soil, free iron oxides in, determination, 162.
Color(s)—
  intermediate and special, trichromatic specifications of Munsell system, 622.
  Munsell book of, tristimulus specification from spectrophotometric measurements, 622.
  Munsell, spacing, report of O. S. A. subcommittee on, 622.
  order systems, history and characteristics, 513.
  solid, psychological, 622.

Colorado College notes, 618.
Colorado Station notes, 618.
Colorado Station report, 268.
Colostrum—
    ewes, ascorbic acid in and effect of ascorbic acid injections, 104.
    of cows, staphylococcal antitoxin in, 727.
    of dairy cows, vitamin A in, effect of vitamin A-rich diet, 109.
Colts management for promoting good growth, N Dak. 348.
Columba—
    species, cellular characters of, interrelation, 434.
    spp., geographic variation of, 529.
Combines, loss of grain by use, determination, Ohio 732.
Community(ies)—*see also* Rural community(ies).
    and family in Prince Edward Island, 753.
    dehydrator for fruits and vegetables, 380.
    farm and nonfarm, taxable property per child in, Iowa 595.
    in southwest, impact of war on, 602.
    neighborhoods, and townships in Wright County, Minnesota, 752.
    planning in Eddy County, N.Mex. 262.
    village-centered, emergence of, S.Dak. 391.
Comperiella bifasciata parasite of California red scale, mass production of, 570.
Concrete—
    beams, precast, high-strength wire for, Colo. 256.
    lightweight structural, properties, 256.
Conifers—
    Diplodia blight in seedbeds, 334.
    in central Rocky Mountains, regeneration in, 220.
    shoot apices, vascular differentiation in, 430.
Connecticut—
    [New Haven] Station notes, 270, 780.
    [New Haven] Station report, 405.
    Storrs Station notes, 143.
    University notes, 143.
Consumer-business relations, 508.
Cooperation—*see also* Agricultural cooperation *and* Marketing cooperatives.
    economic theory of, 127.
Cooperative—
    associations, legal phases of, U.S.D.A. 261.
    housing, bibliographical review, 268.
    marketing, *see* Marketing.
    movement in Latin America, significance in hemisphere solidarity, 749.
    organizations, membership relations in, [N.Y.]Cornell 392.
Cooperia curticei preparasitic stages, overwinter survival on pasture, 366.
Copper—
    compounds, fungicidal value, 452.
    compounds, toxicity to *Pseudomonas mors-prunorum*, 460.
Copper—Continued.
    deficiency of tung trees, 678.
    determination in soil, 6.
    determination with 8-quinolinecarboxylic acid, 6.
    economical use in tomato spraying, 228.
    lead, and zinc, separation with salicylaldoxime, 161.
    on apples, determination, in presence of lead arsenate, 165.
    spray substitutes, 685.
Corktree, Amur, insecticidal principle in fruit of, 463.
Corn—
    and corn hybrids, varieties for Montana, Mont. 439.
    and wheat as main part of hens' laying rations, 244.
    Belt soils, K fixation in, 29.
    borer, European—
        control, treatment of stubble for, Massachusetts State law relative to, Mass. 714.
        evidences of second generation of, 91.
        infestation of sweet corn, relation to growth stages of plant, Conn. [New Haven] 572.
        of New York, N.Y.State 572.
        parasite situation, 707.
        parasites, collection, rearing, and release, 337.
        situation in Ontario, 91, 707.
    bran, chemical examination, 153.
    coleoptiles, variation in rate of elongation, 35.
    comparison of synthetic varieties, multiple crosses, and double crosses, 195.
    cost of production, Mass. 598.
    crop, of North Dakota, data on, N.Dak. 510.
    crossbred strains, root injury by white grubs, relation to lodging, 58.
    dehydrated, methods of storage, and cooking, R.I. 397.
    dent, diseases in Indiana, Ind., 227.
    disease(s)—
        in Guatemala, 687.
        in Southern States, U.S.D.A. 74.
        in United States, U.S D.A. 552.
        studies, S.C. 617.
    dominance in quantitative character inheritance in, 652.
    double cross hybrid, variability of quantitative characters, 654.
    double crosses, actual yield, compared with predicted yield from single crosses, 526.
    ear, elevator for, Mich. 594.
    ear rot fungi, prevalence and geographic distribution, U.S.D.A. 548.
    earworm—
        control, Mo. 574.
        control by clipping, Ky. 238.
        control, dichloroethyl ether in oil as replacement for pyrethrins, 706.

Corn—Continued.
- earworm—continued.
    - control, styrene dibromide as pyrethrum substitute for, 561.
    - on beans, control, 237.
    - on tobacco, S.C. 617.
    - parasite in Hawaii, 574.
- endosperm, developing, amylases and carbohydrates in, 647.
- fertilizer experiments, Ind. 661.
- fertilizer experiments, laboratory data for interpreting results, 180.
- futures statistics, U.S.D.A. 601.
- gene variability in, alleles of *R*. (R^r Series), 652.
- germination under adverse conditions, 58.
- hybrid(s)—
    - and broom, infestation with corn borer, 91.
    - and open-pollinated, composition, relation to soil, season, and maturity, 205.
    - and varieties, tests, Miss. 57.
    - breeding for smut resistance, 40.
    - commercial and station, comparison, Minn. 58.
    - diffusion of seed in two Iowa communities, 754.
    - double cross, involving inbreds of similar and diverse genetic origin, value, 195.
    - in Wyoming, Wyo. 440.
    - story of, Utah, 51.
    - variety tests, N.Mex. 534.
    - yield and maturity, N.Dak. 307.
    - yield test and other important data, S.Dak. 662.
- inbred and hybrid, sterility in, Conn. [New Haven] 40.
- inbreds, parental, hand pollination methods and cost studies, 57.
- leaf blight disease survey of Maryland, U.S.D.A. 319.
- leaf blight, organisms involved in, 324.
- maturity, effect of commercial fertilizers, 58.
- meal and grits, enrichment of, S.C. 411.
- moisture samples, containers for, 58.
- *Nigrospora* on, variability, 80.
- nutrition, use of ion exchange materials in studies on, 36.
- oil, digestive coefficients, 759.
- outlook, Miss. 439.
- performance tests and recommendations, Ohio 57.
- photosynthetic capacity of stalks, leaf sheaths, and leaf blades, 299.
- plant, dry weight, relation to age, Kans. 644.
- planting and cultivation, good practices in, Mo. 58.
- production, land management in, Mo. 58.
- production, saving labor and power in, 257.

Corn—Continued.
- products, enrichment of, S.C. 617.
- protein, properties and growth-promoting value, effect of storage, 134.
- response to different N sources, Miss. 633.
- rootworm, southern, rearing on seedling corn, 562.
- seed treatment experiments, 319.
- seed treatment, mercury v. nonmetallic dusts for, 454.
- seedlings grown in dark, effect of nutrient solutions on size of parts, 35.
- seedlings, reaction to light, effect of nutrient cultures on, 38.
- side-dressing fertilizers for, Miss. 439.
- single crosses, general v. specific combining ability in, 40.
- sirup, dextrins isolated from, structure, 282.
- smut, genetic factors for mutability and mutant characters in, 195.
- source and phosphatase activity of exoenzyme systems, 189.
- spacing for grain and for silage, Miss. 439.
- stalk borer, studies, 97.
- stored shelled, drying by forced ventilation, Ohio 121.
- supplying legume nitrogen to, Miss. 180.
- sweet, *see* Sweet corn.
- top rot, 552.
- uniformity trials, relative efficiency of incomplete block designs, 56.
- varieties and seeding studies, N.J. 51.
- vascular bundle in, morphology and ontogeny, Calif., 651.
- vitamin A-active carotenoids in, relation to number of genes for yellow color, 40.
- waxy, starch from, as tapioca substitute, 152.
- X-ray and ultraviolet induced mutations affecting gene A in, genetic nature, 652.
- yield and cash value per acre in different sections, Minn. 534.
- yield, effect of plowing under ammonium sulfate and other fertilizers, S.C. 617.
- yield increase, relation to N applied, Miss. 439.
- yield, joint effects of temperature and precipitation, technic in measuring, N.C. 630.
- yield, soil fertility practices for, Miss. 439.
- yield tests, Iowa 57, Kans. 205.

Corncobs, composition, uses, and availability, U.S.D.A. 284.

Cornell University notes, 271, 408, 511, 619.

Corticium—
- *koleroga* causing leaf blight of fig, 698.
- *koleroga*, coffee disease due to, 700.
- *rolfsii* on potato tubers, 456.
- *salmonicolor* in New South Wales, control, 695.

Corticium—Continued.
- *stevensii*, causing leaf blight of fig, 698.
- *stevensii* thread blight on tung trees, U.S.D.A. 548.

Corynebacterium—
- *diphtheriae*, staining of metachromatic granules in, 286.
- *pyogenes*, isolation from fetus and later from mammary gland of dam, 588.

Coryneum beijerinckii in apricots and almonds, eradicant spray tests for, 333.

Cost of production, *see specific crops*.

Cotton—
- American upland, correlation of combed staple length on cottonseed with commercial staple length, 662.
- aphid control, La. 711.
- aphid, toxicity of cube-vegetable oil dusts to, 340.
- at different potash levels, yields and composition, effect of adding sodium to fertilizer, S.C. 617.
- autotetraploid Asiatic, and hybrids with diploid species, 196.
- bolls, growth behavior, 662.
- breeding experiments, S.C. 617.
- cellulose content, 157.
- cost of production in southeast Missouri, Mo. 598.
- defoliating with Cyanamid, S.C. 617.
- diseases and injuries in Arkansas, U.S.D.A. 74.
- fabrics, effect of various storage conditions, 615.
- fertilizer experiments, laboratory data for interpreting results, 180.
- fiber, chemical reactivity, relation to type of X-ray diffraction pattern, 650.
- fiber, protecting from periodate oxidation, 651.
- *Fusarium* wilt, pathogenicity studies, 320.
- grade A, varieties yielding 1⅛-in staple, Miss. 51.
- grade, effect of varietal differences on, 662.
- hull fiber, catalytic hydrogenation, 18.
- improvement groups, free classing and market news service for members, La. 748.
- insect(s)—
  - control, Miss. 707.
  - control, insecticide tests and variations in schedule for, 339.
  - in Tanganyika, 463.
  - studies, S.C. 617.
- late application of nitrogen for, Miss. 657.
- leafworm, effect on production, Mo. 465.
- loan program in Tipton Co., Tenn. 385.
- nitrogen requirement, and yield of lint per pound, Miss. 657.
- outlook, Miss. 439.
- oxidized, an immunologically specific polysaccharide, 18.
- Pima, oil glands in, inheritance, 527.
- plant, foliar hydration in, 644.

Cotton—Continued.
- plants, reaction to boll weevil infestation, Miss. 717.
- production—
  - on Coastal Plain soils, effect of sulfur deficiency, 184.
  - reducing labor and power in, 488.
  - value of stable manure in, S.C. 617.
- response to different N sources, Miss. 633.
- response to phosphatic materials and their availability as determined by Official method, discrepancies between, 163.
- root rot and yields, relation to rainfall, 630.
- root rot in Punjab, 324.
- rust, fungus causing, and survey of its hosts, 324.
- sea-island, costs and returns from, P.R.U. 494.
- sea-island varieties, oil formation in, 206.
- seed, *see* Cottonseed.
- seedling(s)—
  - damping-off in, cause, 454.
  - diseases and boll rots, distribution and dissemination, U.S.D.A. 454.
  - diseases, control, relation to dosage of treatment material, U.S.D.A. 74.
  - diseases, seed treatment with reduced dosages of Ceresan, S.C. 617.
  - infection by *Glomerella gossypii* and *Fusarium moniliforme*, 552.
- short staple v. long staple, in western Oklahoma, 382.
- side-dressing fertilizers for, Miss. 439.
- sources of nitrogen for, S.C. 617.
- stands, effects of planter attachments and seed treatment on, Tex. 257.
- staple length, 206.
- Station Miller strain, description, La. 206.
- tap root damage from termites, 708.
- Texas, gearing to war needs, Tex. 122.
- upland, inbreeding, results, 59.
- upland, relation of green lint to lint index, 300.
- upland, wax content and green pigmentation of lint, heritable relation, 300.
- varieties—
  - degeneration within, 59.
  - improved, registration, 206.
  - seed characteristics, relation to ginning, 59.
  - yields, Miss. 51.
- variety tests, 1938–1942, Ga. 59.
- *Verticillium* wilt in Tennessee, U.S.D.A. 74.
- whole, growing and processing, 662.
- whole, recovery of oil from, 153.
- wilt-resistant varieties, tests, S.C. 617.
- yields of different varieties, Miss. 204.
- yields, soil fertility practices for, Miss. 439.

Cottonseed—
  and cottonseed cake, chemical composition, 153.
  carbohydrate-free protein from, composition and properties, 281.
  delinting and treating in Georgia, Ga. 80.
  dusting, vapor action of fungicides prepared for, 325.
  globulin preparations, amino acid composition of, 153.
  hormones for, S.C. 617.
  meal—
    as fertilizer, cost of, Miss. 31.
    detoxification for hogs, Ala. 244.
    for fattening steers, Tex. 243.
    in phenolic plastics, 154.
    in ration of pregnant ewes, 105.
  oil mill crushing capacity and estimated crush, U.S.D.A. 749.
  reginning and dusting, value, N.C. 454.
  treatment for stand improvement, 687.
  treatment recommendations for 1943, Okla. 227.
Cover crops—
  effect on drainage water losses from sandy soil, Conn. [New Haven] 177.
  for California orchards, Calif. 660.
  winter legume, S.C. 617.
Cover-glass preparations, staining rack for handling, 287.
Cow(s)—*see also* Cattle *and* Heifers.
  Aberdeen-Angus and Hereford, comparative lengths of gestation periods for purebred and crossbred calves, 43.
  eliminating *Brucella abortus* in milk, effect of sulfapyridine on, 726.
  family, selection and feeding and care of milk products, W.Va. 584.
  Jersey, proportionate dwarfism in, 43.
  milk production, *see* Milk production.
  staphylococcal antitoxin in blood, milk, and colostrum, 727.
  sulfanilamide treatment, dosage and tolerance, 249.
  udders, *see* Udder.
Cowpea(s)—
  and hay meal in chicken rations, 581.
  as cover crop, effect on leachings from Dunmore silt loam, Va. 520.
  curculio, S.C. 617.
Crab lice on soldiers, tests of mixtures against, 94.
Crab meal in poultry rations, nutritive properties, 582.
Crabapple(s)—
  in eastern United States, anomalous native, status of, 640.
  Virginia, as own-rooted and intermediate stock, 671.
Crambus hortuellus as grassland pest in Great Britain, 574.
Cranberry(ies)—
  blossom induction of, 675.
  dehydrated, methods of drying, storage, and cooking, R.I. 397.
  plants, injury during flooding, 315.
Crawfishes, destroying, directions for, 704.
Cream—
  churning time, relation to degree of solidification of fat in, 110.
  for butter making, pasteurization, N.Dak. 510.
  frozen, storing, Fla. 476.
  light, whipping, N.Y.State 110.
  mold content, factors affecting, Ark. 585.
  pH of, methods of determining with standardized acidity, Iowa 623.
  refrigerated, pasteurized, development of positive phosphatase test in, 357.
  sample, method of churning for mold mycelia determinations, 248.
  selecting for butter making to meet Government mold standards, Mont. 724.
  trucks assembling, from Indiana producers, wartime transportation survey of, Ind. 126.
  visual mold test for, evaluation, 475.
Creamery license division report, Ind. 357.
Creatine formation in chick, experiments on, 581.
Crepis species, cytological methods for, 285.
Cronartium—
  quercuum, cause of rust of Florida pines, 702.
  ribicola, see White pine blister rust.
Crop(s)—*see also* Forage crop(s), Root crops, *and specific kinds.*
  and cultural practices on former apple orchard land, Idaho 672.
  appraisal of phosphorus sources for, 634.
  boron content, 428.
  comparative values for different sections, Minn. 533.
  fertilizer requirement, leaf analysis for determining, 180.
  filter press cake as fertilizer for, P.R.U. 214.
  graphic summary based on 1940 Census, U.S.D.A. 129.
  growth and composition, relation to arsenical spray residues in soil, 563.
  high-value, selection for increasing production in war gardens, Colo. 406.
  insurance, adaptation to tobacco, 381.
  labor and material requirements for, Fla. 745.
  labor requirements, U.S.D.A. 385.
  new, old, and increased, N.Dak. 306.
  pests in Canada in 1941, summary, 91.
  pests in Canada in 1942, 707.
  phosphorus for, calcium and potassium metaphosphates as sources, 183.
  production stability, effect of soil and soil treatment, 418.
  reports, U.S.D.A. 129, 390.
  residue mulches, effect on rain infiltration, 488.
  residues and manure, Ohio 290.
  response to hormone seed treatments, 535, Mich. 535.
  rotations, *see* Rotation of crops.

Crop(s)—Continued.
  seed treatment recommendations for, U.S.D.A. 548.
  selected, in Maryland, labor requirements, Md. 385.
  value of manure for, Miss. 419.
  variety test, S.C. 617.
Cropping systems and soil fertility, Mo. 418.
Crossidius, new species from western North America, 716.
Crotalaria—
  spectabilis immune to root knot nematode, U.S.D.A. 319.
  stands, thinning, in Southeast, U.S.D.A. 74.
Crown gall—
  bacteria, attenuated, tumor formation by, in presence of growth-promoting substances, 76.
  thiamine in, measured with *Phycomyces* assay, 682.
Crucifers, mustard oils in, relation to clubroot resistance, 686.
Cryolite—
  as lead arsenate substitute, 463.
  spray residue, tolerance on, 563.
Cryptococcus isolated from guinea pigs, 112.
Cryptogams, advance in phylogenetic position in, 636.
Crystallization at low temperatures, apparatus for, 1.
Cube resins in spray oils for California red scale, 465.
Cube-vegetable oil dusts, toxicity to species of aphids, 340.
Cucumber(s)—
  experiments at Conservancy District Substation, N.Mex. 214.
  fall, production experiments, S.C. 542.
  fermentation, physical and chemical changes in, 610.
  filter press cake as fertilizer for, P.R.U. 214, 309.
  for pickling, close spacing and medium fertilizer rate for, Miss. 214.
  natural self-pollination in, 42.
Cucurbit(s)—
  downy mildew, control, S.C. 617.
  tetraploid v. diploid races, developmental analysis of fruit, 197.
Cucurbita pepo, anatomy, ergastic substances, and nuclear size in, 194.
Culex abominator, larva of, 562.
Culicifuges, comparative efficiency under laboratory conditions, 467.
Cultivator, subsurface row-crop, 375.
Culverts, box, design, 256.
Cupric-ammonia color system, stability of, 8.
Curbay B-G, value in poultry feed, Md. 472.
Currant(s)—
  black, rust resistant, breeding, 698.
  disease, virus, in Ohio, U.S.D.A. 681.
  red, hybrid groups of, origin and blister rust relations, 333.
  spray residue removal from, U.S.D.A. 669.
Cuscuta, nomenclatural changes in, and notes on American species, 186.
Custard, baked and soft, effect of homogenized milk in, 610.
Cuterebrid beameri of pack rat, biology, 467.
Cuterebrid, rabbit, life history, 118.
Cutworm(s)—
  control in Oregon, Oreg. 343.
  in tobacco fields, control, value of molasses-free baits in, 707.
  populations in pasture grasses, waste lands, and forage crops, 714.
  variegated, differential damage to sweetclover varieties by, 706.
Cyanamid granules, chemical transformations in, effect of soil moisture and rainfall, 419.
Cyclamen mite, hot water treatment for, effect on cyclamen plant, 568.
Cylas formicarius elegantulus, *see* Sweetpotato weevil.
Cypripedium spp., germination and seedling development, 294.
Cyrtopeltis varians cause of tomato red ring, 459.
Cysteine and cystine in mixtures, quantitative estimation, 7.
Cystine and cysteine in mixtures, quantitative estimation, 7.
Cytology and cell physiology, 284.
D-D mixture, as low-cost disinfectant and soil amendment, 224.
Dactylella heterospora, capturing and consuming nematodes, 551.
Dactylis glomerata, meiotic irregularity in, effect of inbreeding, 652.
Dacus cucurbitae, *see* Melon fly.
Dairy—
  cattle and dairy cows, *see* Cattle *and* Cow(s).
  chemistry, Richmond's, revised, 723.
  farm(s)—
    management in Ogden area, Utah 736.
    meeting protein shortage on, N.Y. State and Cornell 354.
    of Wisconsin, labor situation on, U.S.D.A. 130.
  Herd Improvement Associations, Iowa, freshening date changes of cows in, 355.
  herd replacements, status of, Md. 387.
  herds, commercial, diminishing returns in feeding, 387.
  industry of Colombia, U.S.D.A. 496.
  industry of El Salvador, U.S.D.A. 496.
  products—
    dissolved oxygen in, measuring concentration, 9, 166.
    shipments to Allied Nations, 389.
    testing, S.Dak. 475.
  rations, protein in, during present emergency, Vt. 723.
  sires, *see* Bull(s) *and* Sires.
  utensils and equipment, bactericidal action of radiant energy on organisms on, 356.

- Damping-off of seedlings, infectious and noninfectious, N.J. 321.
- Dandelion—
  - control with dichloroethyl ether, 66.
  - rubber, in Wisconsin, Wis. 617.
  - Russian, macrosporogenesis, fertilization, and early embryology, 430.
  - Russian, mechanical requirements for production, 377.
  - Russian, paper on, 31.
  - Russian, seed germination, increasing rate, 663.
- Dark adaptation instrument, new portable, description, R.I. 770.
- *Dasyscypha*—
  - associated with blister rust cankers on *Pinus monticola*, 558.
  - spp., following white pine blister rust, 235.
  - *willkommii* relation to European larch canker, 558.
- Date(s)—
  - Deglet Noor, developmental anatomy of fruit, 194.
  - sugar spotting in, factors affecting, 232.
- *Datura* spp., chromosomal interchange among, 655.
- *Daubentonia punicea* poisoning in pigeons, 254.
- Deer—
  - Columbian black-tailed, dipterous parasites of, life history and morphology, 575.
  - white-tailed, condition of herds in relation to available forage, determination, U.S.D.A. 461.
- Dehydration—
  - experiments with prunes, 763.
  - needed food industry, 263.
  - of cherries, 397.
  - of foods, 263.
  - of foods, present status in United States, 263.
  - of fruits and vegetables and their uses, Ga. 263.
  - of fruits and vegetables in the home, Tenn. 263.
  - of fruits and vegetables of Rhode Island, R.I. 396.
  - of fruits, wartime advantages from, 604.
  - of guavas, 398.
  - of huckleberries, 397.
  - of new potatoes, problem in, 763.
  - of pineapple, 604.
  - of vegetables in the home, Mass. 763.
  - of vegetables, significance of enzyme reaction to, 263.
  - processes, and commercial canning, comparison, 602.
  - summary of lecture on, 763.
- Dehydrator(s)—
  - community fruit and vegetable, 380.
  - operation and basic principles in construction of, 603.
  - small domestic, performance, 493.
- 7-Dehydrocampesterol, a new provitamin D, 283.
- Delaware Station report, 405.
- Delphinium—
  - bacterial crown, stem, and bud rot, 701.
  - in California, *Sphaerotheca humuli fuliginea* affecting, 701.
- Dendrochronology in northern Alaska, 640.
- *Dendroctonus*—
  - *monticolae*, *see* Pine beetle, mountain.
  - *ponderosae*, *see* Black Hills beetle.
- Deodar weevil control on *Cedrus deodara*, plant stimulation as aid, 562.
- Department of Agriculture, *see* United States Department of Agriculture.
- *Dermacentor variabilis*, *see* Dog tick, American.
- Dermaptera of Texas, 83.
- *Dermatea bicolor* n.comb. on *Amelanchier* spp., 701.
- *Dermatobia hominis*, mosquitoes as vectors of, in eastern Colombia, 239.
- Dermestid beetles, natural reservoirs of, 715.
- *Dermestidae*, classification, U.S.D.A. 344.
- Derris root, pure ground, in dusts, toxicity, effect of diluents on, 567.
- Desert trees and shrubs, southwestern, revisions of status, 292.
- Dewberry group of *Rubus* genus, technical descriptions, 34.
- Dextrins, Schardinger α and β, molecular weights, 274.
- *Diabrotica duodecimpunctata*, *see* Corn rootworm, southern.
- Diamondback moth—
  - fungus disease in South Africa, 238.
  - moth larvae, control on collards with rotenone-nicotine dusts, 562.
- *Dianthidium*, nearctic species, racial differentiation, 345.
- Diastase activity of malt, effect of inorganic plant nutrients, 151.
- Diatom, chlorophyll fluorescence and energy transfer in, 649.
- *Diatraea saccharalis*, *see* Sugarcane borer.
- *Didymella lycopersici* on outdoor tomatoes in England, 331.
- *Didymopsora*—
  - *macrospora* n.sp., description, from India, 557.
  - *toddaliae* n.sp., description, from India, 557.
- Diet(s)—*see also* Food(s) *and* Nutrition.
  - American and Asiatic, vitamin B deficiencies in, 756.
  - and nutrition in health and disease, 611.
  - basal, low or high in phosphorus, salt mixture for, 136.
  - Chinese, vitamin B_1 deficiency in, 756.
  - in relation to tooth decay, 756.
  - of children, *see* Children.
  - of home demonstration club members' families, La. 135.
  - poor rice-eaters', improvement, 756.
  - principally of milled rice and dried salted fish, inadequacies and supplements for, 756.
  - under war conditions, 767.
  - white bread, sugar, and meat, inadequacies and means of supplementing it, 755.

Dietary allowances, recommended, 264.
2,6-Di-iodotyrosine formation, kinetics and mechanism of, 276.
Dikraneura carneola, injury to leaves of sweet corn by, 337.
Diogmites umbrinus attacking bees in New England, 576.
Dioryctria—
  reniculella, see Spruce coneworm.
  spp. differentiation, 573.
Dioxane-water mixtures, dibasic acids in, potentiometric titration, 411.
Diphenylamine and other organic compounds, freezing points of binary mixtures of, 275.
Diplodia—
  blight in coniferous seedbeds, 334.
  macrospora, scolecospores in, from market corn, 324.
  pinea on soft pines, 702.
  sp., cause of apple tree heart rot, 555.
  sp. on Jaffa oranges, early detection by ultraviolet rays, 557.
Diplodina sp. on *Hibiscus,* 221.
Diplodinium spp., digestion of cellulose by, 348.
Diprion hercyniae, see Spruce sawfly, European.
Diptera associated with ironweed, 97.
Dirofilaria immitis in insects, larval development, 90.
Diseases—
  food-borne, epidemiology, 724.
  of animals, *see* Animal disease(s) *and specific diseases.*
  of plants, *see* Plant disease(s) *and specific host plants.*
Disinfectants(s)—
  and antiseptics, advances during 1942, 565.
  penetrative powers, Mich. 725.
  testing, effect of varying phenol coefficient, 565.
Distemper—
  canine, in American badger, 118.
  control by tissue vaccine, 591.
  mink, tissue vaccine in control, 118.
  studies in foxes, 729.
Distichlis dentata, status of, 186.
Distillation—
  leakproof stopcock for regulation of take-off during, 2.
  vacuum, pressure-measuring device for, 158.
Distillers' dried solubles as vitamin supplement in chick rations, 580.
Ditches, salt marsh, development in machinery for digging and cleaning, 98.
Dithiocarbamates, metal dialkyl, fungicidal and phytocidal properties, 224.
Ditylenchus dipsaci, longevity of congelations from narcissus, 283.
Divider, tilting arc flow, for reflux ratio control, 412.
Dodder, transmission of potato witches'-broom by, and cure by heat, 551.
Dog(s)—
  active immunization against leptospirosis, 368.
  fate of phenothiazine in, 586.
  reactions to hot atmospheres, 242.
  removal of intestinal parasites from, with citronellol, 254.
  riboflavin requirement, 106.
  sulfanilamide treatment, dosage and tolerance, 249.
  tick, American, toxicity of dinitrophenols to, 346.
Dogwood stem cankers, 235.
Dolichopodidae, new, of western North America, 99, 574.
Dorilaidae, Nearctic, revision, 715.
Doronicum plantagineum, powdery mildew on, in California, U.S.D.A. 681.
Dough(s)—
  physical properties, factors affecting, 20.
  quantity, relation to use of farinograph, 21.
  salt-rising, biochemical properties, 150.
  wheat flour, protease activity and reducing matter in, relation to baking behavior, 150.
Doves, ring-necked, and pigeon hybrids, genetic sex as determined by sex chromosomes, 434.
Draeculacephala minerva vector of grapevine Pierce's disease, Calif. 698.
Drainage—
  areas, evaporation loss per month over, 288.
  water losses from sandy soil, effect of cropping and cover crops, Conn.[New Haven] 177.
Dried fruit moth breeding in nests of mountain carpenter bee, 338.
Drosophila—
  culture, new agar medium for, 51.
  melanogaster, relative susceptibility of sexes to nicotine, 91.
Drought(s)—
  and floods in the United States, 289.
  resurvey of vegetation at end of, in prairie region, 423.
Duck(s)—
  eggs, artificial incubation requirements, 246.
  food plants, preferential rating, 462.
  meat-fed, fibrosis of pancreas in, 254.
  serums, botulinus toxin detection in, 254.
  white Pekin, *Plasmodium cathemerium* 3T strain of, 593.
  wild, treatise, 336.
Dusts for cottonseed treatment, 687.
Earth mite, red-legged, studies, 562.
Earwig, European—
  in California and its fumigation in balled, canned, or potted nursery stock, 93.
  municipal baiting campaign against, 91.
  scouting for in Ontario, 91.

- East African Agricultural Research Station report, 269.
- Easter lilies, yellow flat virus disease, changes in cell structure induced by, 701.
- *Eberthella*—
  - suggestion for discarding as generic name, 319.
  - *typhosa* in apple juice, longevity, 607.
- *Echinocystis macrocarpa*, anatomy, ergastic substances, and nuclear size in, 194.
- Economic and social survey of Botetourt County, Virginia, 602.
- Ectoparasite resistance, new developments in study, 706.
  - and poultry in cookery, 610.
  - and poultry marketing in South Dakota, S.Dak. 125.
  - avian, bioelectric potentials of, stimulating effects of ultraviolet radiation, 433.
  - cooler, summer, for temporary storage on farm, Miss. 493.
  - factors affecting blood spots in, 303.
  - fertility and hatchability, effect of stale sperm on, 305.
  - fertility, effect of time of mating, 304.
  - frozen, production for household use, 605.
  - hatchability, relation to vitamin A in ration, Md. 474.
  - keeping quality, increasing, 246.
  - marketing and pricing in Kentucky, Ky. 743.
  - marketing methods, 579.
  - of domestic birds, volume and physical properties of allantoic and amniotic fluids under different temperatures, 305.
  - preservation by freezing, N.J. 604.
  - production—*see also* Hens, laying.
    - alkaline phosphatase in blood plasma, important factor in, 352.
    - and molting period, effect of increased light, 583.
    - and molting period, effect of methionine feeding, 583.
    - and vermifuge treatments, Ark. 486.
    - increasing in wartime, 352.
    - inheritance of in poultry, 199.
    - relation to vitamin A in ration, Md. 474.
    - v. reproduction in Rhode Island Reds, 199.
  - proper care in home, for quality maintenance, Utah 610.
  - pulp quality tests, 513.
  - shape, genetics of, 46.
  - shell, pasteurization, Mo. 583.
  - shell, stabilizing quality in, Mo. 583.
  - shell treatment by oiling, 108.
  - stimulation of development of embryo by X-rays, 433.
  - technic for photographing early cleavage stages in hen, 287.
  - vitamin A and carotenoids in, spectroscopic studies, Ind. 770.
- Egg(s)—Continued.
  - yolk color, effect of salmon oils in diet of hen, 474.
- Eggplant yellows control, Tex. 85.
- *Eimeria*—
  - *brunetti* n.sp. pathogenic for chickens, 119.
  - spp., effect of moderately low temperatures on sporulation of oocysts, 118.
  - spp. oocysts, survival on soil, 118.
  - *tenella*, graduated doses of, symptoms and immunity following, 112.
  - *tenella* oocysts of chicken, excystation of, 119.
- *Eleagnus argentea*, *Phyllactinia eleagni* n.sp. affecting, 702.
- Electric—
  - brooders, home-made, Ohio 259, Oreg. 379.
  - lamp brooder, new, N.J. 380.
- Electrode polarization in dielectric constant measurements, 273.
- Electron microscope, treatise, 2.
- Elevator(s)—
  - for ear corn, Mich. 594.
  - Ohio farmer owned, financial operations, 748.
- Elm—
  - bark beetle, smaller European, intensity of attacks at distances from dispersion and convergence points, 716.
  - disease, Dutch, control, U.S.D.A. 557.
  - insects, distribution of *Beauveria bassiana* on, 92.
- *Elsinoe*—
  - *ampelina*, *Gloeosporium pestiferum* as synonym, 383.
  - *batatas* n.sp. on sweetpotato stem and foliage, 692.
- Emperor moth, pine tree, survey and control, 238.
- *Empoasca*—
  - *fabae*, *see* Potato leafhopper.
  - leafhoppers, host plants, biology, and feeding habits, U.S.D.A. 711.
- Encephalitis—
  - equine, viruses, St. Louis and western, relation to fowl and mammals, 252.
  - ovine, experimental prophylaxis, 364.
  - virus, Russian spring-summer, and louping-ill virus, relation, 252.
- Encephalomyelitis—
  - equine, and paralytic rabies viruses, immunological relations, 481.
  - equine, identity of viruses from cases, 252.
  - equine, incidence, 367.
  - equine, Venezuelan, in a laboratory worker, 587.
  - equine, virus—
    - course of experimental infection of chick embryo with, 113.
    - dried, preservation in vacuum-sealed tubes, 113.
    - eastern strain, isolation and properties, 368.

Encephalomyelitis—Continued.
  equine, virus—continued.
    induced resistance of central nervous system to experimental infection, 114.
    western strain, electron micrography of, 368.
    western strain, from human spinal fluid, 481, 587.
    western strain, in tissue culture, titration and neutralization, 252, 728.
Endocladia muricata, agar yield from, 33.
Endomyces bispora n.sp., descripion, 89.
Engineers, agricultural, wartime responsibilities of, 255.
Enology, research in, 157.
Enteritis, hemorrhagic, in arctic blue fox caused by virus of feline enteritis, 118.
Entodinium caudatum, digestion of cellulose by, 348.
Entomological problems imposed by war conditions, 561.
Entomology—*see also* Insect(s).
  and plant protection, Federal divisions, war activities of, 707.
  forest, in post-war rehabilitation, 330.
Entyloma peninsulae n.sp., description, new in Canada, 77.
Enzymes, proteolytic, 754.
Enzymology and related subjects of biochemistry, advances in, 147.
Ephedra altissima, shoot apex, structure and development, 194.
Ephestia kuehniella, *see* Flour moth, Mediterranean.
Epicauta, *see* Blister beetles.
Epilachna varivestris, *see* Bean beetle, Mexican.
Epileptiform convulsions in pigs, and pyridoxine deficiency, 591.
Epitrimerus pyri in New York, 337.
Epitrix cucumeris, *see* Potato flea beetle.
Ergot on Natal grass in Florida, U.S.D.A. 75.
Eriophyid studies, 101.
Ernestia, Canadian species, review, 574.
Erosion, *see* Soil erosion.
Erwinia—
  phytophthora cause of disease in delphinium and larkspur, 701.
  suggestion for discarding as generic name, 319.
Erysiphe—
  cichoracearum powdery mildew of sun flowers, 692.
  graminis tritici infecting wheat, effect of temperature, 687.
  polygoni on ribbonbush, 557.
Escherichia—
  coli—
    action on vitamin C, 282.
    effect of metal ions on reactions o phosphopyruvate by, 146.
    in apple juice, longevity, 607.
    vitamin synthesis by, 769.
Escherichia—Continued.
  suggestion for discarding as generic name, 319.
Ethylene in automobile exhausts or fruit storage rooms, measurement of small concentrations, 34.
Euclatoria armigera parasite of noctuid caterpillars in Hawaii, 574.
Eudiplodinium neglectum culture and experiments on digestion of cellulose, 347.
Euphorbiaceae chromosome number and phylogenetic relations, 653.
Eusimulium—
  osborni n.sp., description, 576.
  quadratus n.sp., description, 576.
Eutettix tenellus, *see* Beet leafhopper.
Eutrombicula alfreddugèsi, *see* Chiggers.
Euxoa, *see* Cutworm(s).
Evaporation—
  effect of surface stones on, 632.
  loss per month over drainage areas, 288.
  measurement and atmospheric turbulence, 627.
Evergreens, broadleaved, effects of defoliation on cold resistance and diameter growth, 679.
Ewes—*see also* Sheep.
  ascorbic acid in blood, colostrum, and milk of, and effect of ascorbic acid injections, 104.
  breeding, nutritive value of alfalfa for, 719.
  gestation period and multiple births in, 198.
  induction of oestrus and ovulation in, during anoestrus season, 650.
  pregnant, cottonseed meal in ration, 105.
  yearling Rambouillet, wool fineness in eight sampling regions, 720.
Exenterus, European spp., laboratory propagation, 91.
Experiment stations—*see also specific stations*.
  of Algeria, conduct of cultural tests in, 269.
  organization list, U.S.D.A. 406.
  report, 778.
  State, Federal legislation, rulings, and regulations affecting, U.S.D.A. 406.
Experimental data, treatment of, 779.
Experimentation, fundamentals of, 652.
Fabrics, *see* Textiles *and specific kinds*.
Family—*see also* Farm family(ies).
  and community in Prince Edward Island, 753.
  and individual social participation, 753.
  spending and saving in wartime in rural areas, U.S.D.A. 507.
Farm—
  accidents in Ohio, nature, causes, and costs, 749.
  adjustment money payments for soil-building practices, farmer response to, La. 746.
  adjustments in Rolling Plains Area, information basic to, Tex. 597.

Farm—Continued.
  animals, *see* Livestock *and* Animal(s).
  building(s).
    construction, wartime, 258.
    efficient, a wartime need, 259.
    standardization, 378.
  business, planning, Kans. 259.
  credit, *see* agricultural credit.
  crops, varieties for Montana, Mont. 439.
  earnings and management sharing to hold workers on farms, Mo. 745.
  family(ies)—*see also* Family.
    effects of first year of war, Nebr. 777.
    in the Grange, [N.Y.]Cornell 131.
    live-at-home programs, limitations of, 750.
    social participation of, [N.Y.]Cornell 392.
    socioeconomic status scale, short form of, 753.
    use of consumer credit by, Mo. 140.
  freezing units, Ind. 762.
  income, net, and income parity summary, U.S.D.A. 122, 747.
  income, new light on factor analysis of, 382.
  income of State and Nation, level and outlook, Miss. 779.
  irrigated, man power requirements and available labor outlook for 1943, Ariz. 596.
  labor, *see* Agricultural labor *and* Labor.
  leaders in selected rural counties, education of, N.C. 498.
  machinery, *see* Agricultural machinery.
  management in the South, 131.
  management research contribution to attainment of production goals, 381.
  of Kansas, corporations as landlords, Kans. 123.
  of New Mexico, labor needs for seasonal operations, N.Mex. 260.
  of Puerto Rico Reconstruction Administration, P.R.U. 493.
  output, maintaining with scarcity of production factors, 381.
  plan, developing, forms for use in, 745.
  planning for soil and water conservation, economic aspects, 745, 746.
  populations in rural Connecticut, ethnic group relations in, [Conn.]Storrs 751.
  price(s)—
    and costs in Michigan and war, Mich. 598.
    for food production, 740.
    for selected foods, and wholesale and retail, estimated lags between, U.S.D.A. 747.
    of Indiana, 1841 to 1941, Ind. 129.
    of North Dakota, N.Dak. 129, 510.
    parity and industrial wage policies, 381.
  products, *see* Agricultural products.
  property assessments, changes and equalization produced in, by reassessing, Md. 384.

Farm—Continued.
  realty changes in eastern and western United States, 735.
  Security Administration borrowers, contributions to agricultural production goals in Corn Belt, 381.
  size of, and output per farm worker in Ohio, 736.
  size relation to volume of production, operating costs, and net returns, Nebr. 597.
  small, in Ohio, labor, power, and machinery on, 735.
  storages, moisture accumulation in walls, vapor barriers against, Mich. 595.
  taxation, *see* Taxation *and* Taxes.
  tenancy areas in Ohio, 747.
  tenure—*see also* Land tenure.
    under strain of war, 381.
  wage rates and employment, U.S.D.A. 493.
  work, productive capacity, effect of age and sex, Wash. 745.
  yields of feed from major Oklahoma crops, Okla. 382.
Farmers—
  and organized labor, 381.
  beginning, problems in Iowa, Iowa, 597.
  cooperative(s)—
    associations in Florida, citrus cooperatives, trends in and success of, Fla. 747.
    discontinuances, 1875–1939, U.S D.A. 598.
    marketing and purchasing statistics, U.S.D.A. 747.
  investments by, Mich. 385.
  low-income, rehabilitation, U.S.D.A. 743.
  subsistence, war relocation to areas of farm labor needs in Ohio, 743.
Farming—*see also* Agriculture.
  contour, soil conservation values of, Iowa 178.
  dairy, *see* Dairy farm(s) *and* Dairy industry.
  dollars and sense in, Mich. 598.
  dry-land on Zuni Plateau, New Mexico, economic appraisal, U.S.D.A. 123.
  for greater production of war crops in intermountain and southewestern country, U.S.D.A. 488.
  part-time, in land use areas of Columbiana County, Ohio, 736.
  systems in King and Snohomish Counties, Wash. 123.
  units in land use areas, changes in size in Ohio, 736.
Fat(s)—*see also* Oil(s).
  and fatty foods, stabilization, 263.
  animal and vegetable, digestibility, 759.
  dietary, noncaloric functions, 760.
  edible, chemical characteristics, 132.
  metabolism, 755.
  shortening value, comparison, 394.
  synthesis, nonspecificity of thiamine in, 139.
  utilization by Herbivora, 104.

- Fatty acids, volatile, determination, 162.
- Feather development in fowls, physiology of, production and analysis of chimeras, 46.
- Feed crops, increasing production, N.J. 51.
- Feed units per acre and per hour of man labor for principal crops, Okla. 494.
- Feeding liberated countries and nutrition program, 765.
- Feeding stuffs—
  - analyses, N.J. 102, Vt. 718.
  - choline content, 354.
  - commercial, use made of ingredients indicated in analysis, Mo. 102.
  - evaluation on basis of net available nutrients, 102.
  - farm yields from major crops, Okla 382
  - for cattle, determinations of metabolizable energy, 718.
  - inspection and analyses, Tex. 469.
  - seasonal price variation and economy Ind. 747.
- Fence post(s)—
  - service test in Mississippi Delta, 548.
  - treating with pentachlorophenol and fuel oil solutions, 318.
  - wood, overturning resistance of, 492.
- Fermate—
  - disease control with, U.S.D.A. 319.
  - promising new fungicide, N.Y.State and Cornell 321.
- Fertilizer(s)—
  - analyses, Conn.[New Haven] 185, N.J. 31.
  - device for plowing under, 489.
  - duff briquette, preparation, use, and effect on plants, 522.
  - experiments for brown loam area, Miss 419.
  - experiments on fertile Delta bayou-bank soil, Miss. 419.
  - for California orchards, Calif. 669.
  - getting most from, for vegetable crops Pa. 309.
  - inspection and analyses, Ky. 635.
  - materials, organic, carbon-hydrogen ratios in, relation to N availability, 633.
  - moisture determination in, 163.
  - nitrogenous, *see* Nitrogenous fertilizer.
  - organic nitrogen, S.C. 617.
  - program for soil fertility maintenance, N.C. 418.
  - recommendations for 1943, Miss. 31, Wash. 418.
  - results, effect of fertility level of soil, Miss. 419.
  - samples, grinding, for analysis, 162.
  - situation, Miss. 31.
  - tests, *see special crops.*
  - war grades of, use, Tex. 31.
  - wartime, for New Jersey, N.J. 185.
- Fiber—
  - of native plants, N.Mex. 204.
  - plants, Cuban, acid scarification of seed, 60.
  - plants in New Mexico, N.Mex. 204.
  - production in America, 535, U.S.D.A.
- Fiber—Continued.
  - production in Western Hemisphere, 535, U.S.D A. 535.
  - structure, swelling-staining reagent for study, 651.
- Field crops, *see* Crop(s), Forage crop(s), Root crops, *etc.*
- Field experiments—
  - additional lattice square designs, Iowa 533.
  - with crop rotations and fertilizers, fifty years of, at Sanborn Field, Mo. 417.
- Fig—
  - fruits, mosaic spots of, 556.
  - leaf blights, studies, 698.
  - seedlings, effect of root knot on, U.S.D.A. 548.
- Filbert diseases in Pacific Northwest, U.S.D.A. 74.
- Films, thin, determination of drying rates, 160.
- Filtration at low temperatures, apparatus for, 1.
- Finance and county road use in Maryland, Md. 383.
- Financial relations, State and local in Texas, Tex. 260.
- Fir, Douglas—
  - cuttings, field survival, 71.
  - growth measurement in, new methods and results, 71.
  - seedbeds, *Diplodia* blight in, 335.
  - stands, damage from severe ice storm, 317.
- Fire ant tests, thallium baits for control, 345.
- Fire blight of pear and apple trees, control with pollenicides, 232.
- Fish—*see also specific kinds.*
  - balance, pre-war, of Norway, U.S.D.A. 495.
  - for food from farm ponds, U.S.D.A. 462.
  - game and pan, production management of ponds for, 237.
  - management, problems and procedures in, 237.
  - meals, nutritive value, 103.
  - ponds, farm, building and management, 706.
  - preservation by freezing, N.J. 604.
  - yield increased by fertilization, Miss. 706.
- Fishermen, Puerto Rican, practices and operating costs, P.R.U. 387.
- Flagellares, technical descriptions, 34.
- Flax—
  - cash value per acre at different sections, Minn. 534.
  - chlorotic dieback on calcareous soils, 325.
  - dew retting in Australia, 288.
  - disease(s).
    - in Kansas, 319.
    - resistance, breeding for, 225.
    - seed-borne, prevention by seed disinfection, 688.
  - flowering, physiology of incompatibility in, 643.

- Flax—Continued.
  - machinery and processing operations in Oregon, U.S.D.A. 258.
  - pasmo disease, 553, 688.
  - production with less labor and power, 488.
  - Redson, studies, Wis. 617.
  - results from research, N.Dak. 440.
  - retting, *Rhizoctonia bataticola* on, 227.
  - rust, physiological specialization in, 227.
  - seed treatment, N.Dak. 455.
  - spinning, for bags on cotton mill machinery, 440.
  - stands, effect of diseases and threshing injury, Wash. 455.
  - varieties for Montana, Mont. 439.
  - vegetative shoot, vascular differentiation in, 300.
- Flaxseed—
  - oil mill crushing capacity and estimated crush, U.S.D.A. 749.
  - treatment with Spergon, value, 225.
  - yield and oil content, effect of climate, U.S.D.A. 168.
- Flea beetle damage to garden crops, Mo. 463.
- Fleas—
  - collected from Oklahoma cottontail rabbit. 99.
  - control. 562.
  - on rats in Western States, relation to plague dissemination, 576.
- Flicker, red-shafted, *Hypodectes chapini* n.sp. from, 101.
- Flood(s).
  - and droughts in the United States, 289.
  - in New Hampshire, June 1942, 166.
  - of March 1938 in southern California, 732.
- Flora, *see* Plant(s) *and* Vegetation.
- Florida Station notes, 143, 618.
- Florida Station report, 778.
- Florida University notes, 143.
- Flour—*see also* Bread(s).
  - absorption studies, 21.
  - beetle, black, in British Columbia, 95.
  - beetle, confused, nutritional requirements, 95.
  - beetle, confused, toxicity of nitroparaffins to, 337.
  - beetle, red, toxic efficiency of volatile organic compounds for, effect of carbon tetrachloride, 568.
  - doughs, protease activity and reducing matter in, relation to baking behavior, 150.
  - enrichment of, 263.
  - hard winter wheat, effectiveness of dry milk solids in preventing overbromation, 22.
  - moisture results, precision between and within laboratories, 165.
  - moth, Mediterranean, rise in temperature due to metabolism in cultures, 91.
  - wheat, in ice cream mix, 358.
  - wheat, lipoprotein of, crystalline protein obtained from, 19.
  - wheat, net weight changes and moisture in, at various relative humidities, 21.
- Flowers—*see also* Plant(s), flowering, *and* Plant(s), ornamental.
  - "good neighbor," U.S.D.A. 219.
- Fluorine—
  - compounds, volatile, as insecticides, 337.
  - inorganic compounds, determination, 6.
  - in plants fertilized with fluoride-carrying phosphates and slags, 522.
  - spray residue, tolerance on, 563.
  - toxicity, 563.
- Fly(ies)—
  - control, 562.
  - control in dairy barns, 240.
  - house, *see* Housefly.
  - myiasis-producing, life history, 468.
  - population of New Haven in 1942, 574.
  - repellents, tests on dairy cattle, 344.
  - sprays, studies, Wis. 617.
- Fodder crops, *see* Forage crop(s).
- Food(s)—*see also* Diet(s).
  - administration experience with hogs, 381.
  - and agriculture, United Nations Conference on, final act and section reports, 755.
  - and planning, treatise, 498.
  - balance, wartime, of continental Europe, U.S.D.A. 495.
  - canned, manual, 133.
  - conditions in North Africa, 765.
  - consumption studies, Hawaii 501.
  - dehydrated, for Army, 134.
  - drying and dehydration, 762.
  - for people, treatise, 392.
  - for young children in group care, 136.
  - freezing, and cold storage, 263.
  - freezing preservation, 133, N.J. 604.
  - frozen, containers and container materials, 605.
  - frozen, farm type cabinet for, 380.
  - fumigated with methyl bromide, bromide in, 563.
  - Hawaiian-grown, nutritive values, Hawaii 499.
  - health, vitamins, treatise, 262.
  - home production, advantages, Ill. 132.
  - in home, insects destructive to, Mo. 463.
  - Indian, vitamins in, relation to the state of nutrition of population, 756.
  - management and inflation, 740.
  - mineral and vitamin values, recent data, 769.
  - nicotinic acid in, 139.
  - nutritive value, effect of processing, 762.
  - packaging for overseas use, 263.
  - packaging trends, 263.
  - plants, emergency, of islands of Pacific, 523.
  - poisoning, treatise, 764.
  - policy, wartime, of Great Britain, 881.
  - preservation, 263.
  - preservation by drying, N.J. 762.
  - price control, policy and mechanics, 381.
  - prices, retail, rise in Puerto Rico, P.R.U. 129.
  - processing, nutritional aspects, 263.
  - processors, cooperative, more manpower for, U.S.D.A. 748.

Food(s)—Continued.
  production—
    and distribution, 739.
    and tractor costs, Wash. 493, 494.
    program, more manpower for, Wash 493.
  products as sources of food, relative efficiency, U.S.D.A. 739.
  products, stored, pests, spelling of scientific names of, 338.
  provitamin A content, chromatographic adsorption method for estimation, 513.
  rationing and morale, 740.
  rationing, French, U.S.D.A. 496.
  relevance at time of occupation in North Africa, 765.
  requirements for overseas use, 263.
  research in, 509.
  sanitation, acid detergents in, 268.
  situation, British, and lend-lease shipments, U.S.D.A. 127.
  situation inside Holland, 765.
  situation inside Poland, 765.
  stored, insects of, Calif. 563.
  strategy, 740.
  sufficiency, restored, Yugoslavian plans for, 765.
  supplies, home production, Tenn. 266.
  supplies of Frederick and Salisbury, Md. 389.
  supply of United Nations, contributions of British Dominions to, U.S.D.A. 127.
  values, tables, 132.
  vitamin values, in terms of common measures, U.S.D.A. 138.
  vitamin B_1 in, estimation, improved method, 10.
  vitamins in, recent data, 769.
  with alkaline balance, ash determinations in, 10.
Forage—
  crop(s)—
    cutworms and armyworms in, 714.
    diseases, unusual, in Kansas, 319.
    diurnal changes in, 31.
    fertilized with phosphates and slags carrying fluorides, fluorine in, 182.
    improvement, controlled heterosis as method, 652.
    improvement on Pacific Northwest grazing areas, range practices for, U.S.D.A. 306.
    sulfur in, N.Dak. 410.
  legumes, parasitic fungi from, in Pacific Northwest, U.S.D.A. 74.
  plants, hemicelluloses of, 17.
  poisoning, *see* Livestock poisoning, Plant(s), poisonous, *and specific plants.*
Forest(s)—
  cutover, in southern Appalachians, 545.
  entomology in post-war rehabilitation, 339.
  entomology, report, 463.
  insects of Quebec, 463.
  insects, survey, 463.
Forest(s)—Continued.
  management, effect on local economy of Dorchester, N.H. 738.
  nursery seedlings, grading and counting machine for, 545.
  of Cumberland Mountains, 545.
  pathology, relation to rehabilitation, 235.
  protection and management, development, effect of insects on, 339.
  resources and industries—
    of Georgia, U.S.D.A. 680.
    of Louisiana, U.S.D.A. 681.
    of northern Idaho, U.S.D.A. 545.
  resources of ponderosa pine region of Washington and Oregon, U.S.D.A. 220.
  seedlings, transplanting, machine for, 545.
  soils, *see* Soil(s).
  trees, *see* Tree(s).
  virgin, on Allegheny Plateau, soils in, 25.
Forestry—
  in New England, 680.
  practical, in Hudson highlands, 317.
  problems, empirical log rule use for, 548.
  studies, Wis. 617.
Forficula auricularia, see Earwig, European.
Foulbrood—
  American, breeding queens for resistance to, 468.
  American, resistant strain of bees to, performance, 562.
  diseases of bees, 338.
Fouquieria splendens vegetative and floral growth, 645.
Fowl(s)—*see also* Chick(s), Chicken(s), Hens, Poultry, *etc.*
  genetics of, 200.
  plague, chick red cell agglutination test with, 592.
  pox virus—
    chick embryos inoculated with, immunogenic properties of yolk, albumin, and embryo proper, 119.
    prepared from entire embryo, immunogenic properties, 592, 731.
  spleen volume in course of *Plasmodium gallinaceum* studies, 592.
  testis, pathological condition of, 119, 729.
Fox(es)—
  Chastek paralysis from feeding frozen smelt, 368.
  Chastek paralysis from feeding herring, outbreak on ranch in Alberta, 369.
  coccidiosis a menace to, 729.
  digestibility of high protein feeds by, 106, 472.
  in wild turkey territory, food habits, 559.
  ovulation, maturation, and fertilization in, 50.
  red, food of in southern New Hampshire, 89.
  red, internal parasites of, in Iowa, 729.

Fox(es)—Continued.
  silver, selective elimination in eastern Canada, 302.
  silvering in, inheritance of degree of, 704.
  sperm oxygen consumption, 304.
  vitamin A requirement, minimum, 118.
Frankliniella occidentalis, calcium cyanide fumigation for, 708.
Frog raising, 706.
Frost(s)—
  conditions in Imperial Valley of California, 167.
  tabulated data, Ga.Coastal Plain 517.
Fruit(s)—*see also* Orchard(s), Apple(s), Peach(es), *etc.*
  and fruit products, potassium in, determination, 165.
  and vegetable(s)—
    botanical distinctions between, Ohio 668.
    cooperatives in North Atlantic States, services of, U.S.D.A. 380.
    cooperatives, wartime adjustments of, U.S.D.A. 497.
    sales in selected retail stores, 743.
  blanching and preparing for locker storage, 606.
  citrus, *see* Citrus fruit(s).
  crops, diseases and winter injury in New Hampshire, U.S.D.A. 681.
  crops, injury by freeze of Nov. 1940, 629.
  crops, spraying requirements, Miss. 215.
  cut, cost of drying, Calif. 386.
  cuts, large, canning costs, 607.
  dehydrated, methods of drying, storage, and cooking, R.I. 396.
  dehydration—
    and their uses, Ga. 263.
    in the home, Tenn. 263.
    studies, 263.
    wartime advantages from, 604.
  disease(s)—
    and weather cycles at Hood River, Oreg., U.S.D.A. 74.
    control, La. 329.
    control, modified practices under war conditions, 332.
    control under war emergency conditions, 331.
    in Idaho, U.S.D.A. 74.
    in Massachusetts in 1942 and prospects for 1943, U.S.D.A. 74.
    in 1942, 694.
    in Trinidad, 221.
    in Washington State, U.S.D.A. 74.
    reported from Pennsylvania, U.S.D.A. 681.
    situation in 1942, 331.
  dried, nutritive value, 396.
  dried, shipping to Tropics, 398.
  Florida, vitamins A and C in, Fla. 770.
  for dietary surveys, ascorbic acid in, 773.
  freezing, directions for, 605.
  freezing preservation, Colo. 762, N.J. 604, Utah 501.
Fruit(s)—Continued.
  fresh, frozen, or dehydrated, ascorbic acid determination in, 515.
  fresh, wartime motor truck transportation of, 740, Ohio 389.
  frozen, quality in, Minn. 133.
  growers of New York, wartime economic situation, 740.
  grown in Northwest, wartime transportation, U.S.D.A. 741.
  home drying with W. S. C. dehydrator, Wash. 763.
  home storage, N.J. 542, U.S.D.A. 810.
  insect control in wartime, 339.
  insect problems in 1942, 339.
  juice preparation and preservation, 263.
  juices, home preservation, N.J., 762.
  market diseases of, U.S.D.A. 556.
  moth, oriental—
    control by mechanical means, 706.
    parasitization of twig-infesting larvae of, relation to subsequent infestation of ripe peaches, 713.
    quarantine, problems of enforcement, 91.
    studies, 562.
  of Utah, freezing preservation, Utah 501.
  peeling by new lye method, 283.
  pests of Baluchistan, 92.
  preservation in wartime, methods, Mont. 602.
  preserving with sulfur dioxide solution, 607, 608.
  propagation for home gardens, Miss. 68, 312.
  retail outlets in New York City, U.S.D.A. 742.
  retail pricing, U.S.D.A. 742.
  small, ascorbic acid in, 402.
  small, disease control situation, 697.
  small, for home garden, N.J. 70, Ohio 314.
  small, preparation and preservation of juices from, 606.
  SO_2 treated, quality of jams made from, 609.
  spray residue removal from, U.S.D.A. 669.
  stone, diseases, variables in control of, 332.
  stone, virus diseases of, 231.
  stone, virus diseases, spread in Oregon, 231.
  storage requirements, 760.
  studies, Wis. 617.
  sulfited, ascorbic acid in, determination, 626.
  surface area, methods for approximate prediction, 446.
  trees(s)—
    diseases, virus, in Washington, 694.
    nursery, dwarf and standard understocks, handling and planting, Wash. 668.
    propagation, Mich. 668.
    wood rot in New South Wales, 694.

- Fruit(s)—Continued.
  - varieties—
    - and regional adaptation, 543.
    - for home and commercial gardens, Wash. 217.
    - select list, Tenn. 445.
- Fruitfly, Mexican, survival periods for eggs of, during vapor-heat sterilization, 337.
- Fuel value of Missouri tree species, Mo. 73.
- Fumigants of nitroparaffin group, 337.
- Fumigation—
  - latest advance in, 340.
  - purposes, gas-tight fabric for, 338.
- Fungi(us)—
  - and fungus spores, freezing preservation, 450.
  - antagonistic, studies, 291.
  - attacking plants in Peru, 681.
  - conserving names of, 523.
  - culture medium of corn meal and starch mush to replace agar for, 449.
  - entomogenous, effect of fungicidal sprays on, 712.
  - flora of air in Buenos Aires and its environs, 638.
  - geographical distribution, 638.
  - growth, reflector scale for measuring, 449.
  - hyphae, composition of, 450.
  - numbers of, in Great Britain, 292.
  - of Rio Grande do Sul, Brazil, 549.
  - of Victoria, Australia, 292.
  - on forage legumes, list and host index, U.S.D.A. 686.
  - parasitic and saprobic, of southern Ohio, U.S.D.A. 74.
  - parasitic, collected on forage legumes in Pacific Northwest, U.S.D.A. 74.
  - parasitic, of Wisconsin, 221.
  - pathogenic, isolated from animals, 112.
  - relation to thiamine, 424.
  - soil-borne, effect on virulence of *Rhizoctonia solani*, 76.
  - tolerant to extreme acidity and high copper sulfate concentrations, 685.
  - wood-decaying, effect of extracts of cedar heartwood on, 334.
  - wood rot, types in New South Wales, 694.
- Fungicidal action, mechanism, 452.
- Fungicide(s)—*see also* Spray(s) *and specific kinds.*
  - analyses, Me. 214, N.J. 92, 214.
  - copper, *see* Copper.
  - protectant, evaluating method, 452.
  - terms, definitions of, 449.
  - use during wartime, 75, 223, 451.
- Fur animal(s)—
  - breeding practice, sperm studies as guide, 51.
  - of New York, nematodes from lungs and frontal sinuses of, 119.
- Fur(s)—
  - damage from *Ptinus tectus* in Alaska. 562.
  - laws, 1941–42, abstract of, 704.
  - selection and care, publications on, 704.
- Furnace, gas-fired, for semimicrodetermination of carbon and hydrogen, 412.
- Furniture, slip covers for, U.S.D.A. 616.
- *Fusarium*—
  - blight resistant barley varieties and strains, 551.
  - *bulbigenum lycopersici*, increase of pathogenicity to tomatoes, 86.
  - *moniliforme* disease of corn seedlings grown in nutrient solution, 319.
  - *moniliforme* infecting cotton hypocotyl, 552.
  - *orthoceras* isolated from castor-beans, 555.
  - *oxysporum*—
    - *cubense*, antagonism of *Actinomyces* to, 320
    - *cubense* growth, effect of soil and chemical mixtures, 320.
    - f. *tuberosi* cause of stem-end discolorations of potatoes, 81.
  - *solani minus* affecting sunflower in Buenos Aires, 692.
  - spp., action of xanthones on dehydrogenations by, 187.
  - spp. from tobacco, sweetpotato, and cotton, pathogenicity studies, 320.
  - wilt in potatoes, effect of crop rotations, 227.
  - wilt organisms, cross-inoculation with, S.C. 617.
- Galactose, intestinal absorption in rat, effect of vitamin B deficiency, 400.
- *Galeropsis*, North American species, 639.
- Gallic acid esters and polyesters, preparation and tests for leather forming properties, 275.
- Galls attached to leaves, collecting and storing without pressure, method, 707.
- Gallstone formation and intake of B vitamins in cholesterol-fed guinea pig, 503.
- Game preservation by freezing, N.J. 604.
- Gapeworm in turkey and ring-necked pheasant, acquired resistance to, 120.
- Garden(s)—
  - city home, planning, planting, and care. U.S.D.A. 66.
  - home—
    - in Hawaii, Hawaii 445.
    - management, N.J. 445.
  - vegetable, for meeting nutrition problem, 602.
  - victory, wartime control of insects in, Miss. 463.
- Garlic—
  - bulb canker due to *Helminthosporium allii*, 319.
  - production, diseases, and insects, Tex. 67.
- *Garnotia mindanaensis* n.sp., description, 292.
- Gases, respiratory, movement through waxy coatings, 159.
- Gasoline requirements for farm operations, 732.
- Gastritis, parasitic, in sheep, phenothiazine and mineral supplement tests for, 483.

Gelidium cartilagineum, agar yield from, 33, 636.
Gene variability and spontaneous mutation, 652.
Genetics, principles, 38.
Geography, economic, fundamentals of, 131.
Georgia Coastal Plain Station report, 616.
Georgia Station notes, 270, 618.
Germ cells, definitive in mice, origin and differentiation of, 50.
Gibberella spp., cause of corn top rot, 552.
Gibbsite, occurrance in soil-forming materials, 174.
Gigartina spp., agar yield from, 33.
Gladiolus—
  bulbs, treatment for bacterial scab and *Fusarium* rot, 89.
  Fusarium yellows and *Sclerotinia* dry rot, differentiation, 233.
  ring spot disease of corms, 88.
  thrips, control, substitutes for tartar emetic and brown sugar, 709.
Glass valve pressure regulator, 1.
Glass wool, pyrex brand as filtering medium, 412.
Gloeosporium pestiferum, synonym of *Elsinoe ampelina*, 333.
Glomerella—
  cingulata, symptoms and life history on apple, Del. 459.
  gossypii infecting cotton hypocotyl, 552.
Glutamic acid isolated from casein hydrolyzates, optical configuration, 275.
Glutathione—
  in alkaline solutions, absorption of oxygen by, at pH 9 to 11, 278.
  treatment of four generations of rats, effect, 528.
Glycine—
  effect on lactic acid bacteria, 185.
  phospho-12-tungstates of, solubilities and compositions, 148.
Glycogen, chemistry of, 147.
Glyptonysius, new genus, in Hawaii, 94.
Gnat, Clear Lake, ovicides for, 343.
Gnorimoschema operculella, *see* Potato tuber worm.
Goat's milk from animal suffering from *staphylococcus mastitis*, fatalities due to, 590.
Goats, pregnant, and their offspring, effect of phenothiazine, 117.
Goats, young, weaning at birth and hand-feeding, 475.
Goldenrod, rubber-bearing, mechanical requirements for production, 377.
Gonadotropic effect of pregnant mare serum, augmentation of, 50.
Gonadotropins, pituitary, effect on ovaries and induction of superfecundity in cattle, 44.
Goose, blue, life history, 90.
Gorse weevil, studies, 96.
Gourd, large, or Hawaiian ipu nui, botanical identity, 292.
Gourd, sponge, 31.
Gracilaria confervoides, extraction of agar from 636.
Grain—*see also* Cereal(s) *and* Oat(s), Rye, Wheat, *etc.*
  in Knoxville trade area, disposition and outlets for, Tenn. 388.
  in Knoxville trade area, movement, transportation, and prices, Tenn. 388.
  kernels, *Alternaria* sp. on, killed by high temperature storage, 225.
  loss from use of combine, determination, Ohio 732.
  samples microtest-weight method for, 8.
  seed grown in Saskatchewan, examination for disease, 225.
  seed treatment, value of Spergon for, 225.
  small, and lespedeza rotation in Missouri, 534.
  small, cash value per acre at different sections, Minn. 534.
  small, measuring effects of awns and other characters, 51.
  storage, keeping quality, factors affecting, 665.
  storage, timely tips on, N.Dak. 510.
  stored, possible fumigants for, 337.
  studies, Wis. 617.
Gramicidin, toxic effects in mice and dogs, 250.
Gramineae root rots in Northern Great Plains, U.S.D.A. 681.
Grape(s)—
  Almeria, pollination of, 676.
  anthracnose fungus, Gouirand and Bergeron's treatment of, 556.
  anthracnose fungus, taxonomic note, 333.
  dead arm disease, U.S.D.A. 681.
  Emperor, selection for fruit color in, 676.
  fertilizer plats, initial results from, 677.
  for different regions, U.S.D.A. 315.
  French hybrid vine, use in breeding hardy grapes for eastern United States, 676.
  muscadine—
    aerial propagation, S.C. 544.
    home use, U.S.D.A. 133.
    yields, effect of time and method of pruning, 676.
  regions of United States, 675.
  spray residue removal from, U.S.D.A. 669.
  spraying, new developments in, 698.
Grapevine(s)—
  injury to young trees, 703.
  Pierce's disease in California, Calif. 698.
  response to winter temperatures, relation to dormancy requirements, 677.
Grapholitha molesta, *see* Fruit moth, oriental.
Grass(es)—*see also* Grassland *and* Pasture(s).
  Australian, standard common names for, 523.

Grass(es)—Continued.
  classification and description of *Paspalum* and *Panicum* in United States, 437.
  composition and palatability to cows, 280.
  differences in sugar content, relation to soil fertility and growth, 52.
  diseases in Kentucky, U.S.D.A. 74.
  effects of soil and air temperatures on, 642.
  for cover on soils deficient in organic matter, Mich. 535.
  forage, grown for seed production, rust fungi of, 80.
  forage, seed treatment for damping-off control, U.S.D.A. 74.
  germination and emergence, relation to litter cover and soil moisture, 52.
  leaf spot of, 227.
  native, seeding, Okla. 53.
  new, from Philippines and South India, 292.
  nutritional significance, 469.
  of Montana, seasonal changes in lignin and cellulose content, 102.
  pasture and turf, atmospheric drought tests, 535.
  pasture, cutworm and armyworms in, 714.
  pasture, evaluation of individual plants in association with white clover, 56.
  range, germination and early seedling development, 52.
  roots, colonies of *Bacterium tabacum* on, 552.
  sedges, and rushes, British, 658.
  seedling blight and root rot in Minnesota, 79.
  silage, *see* Silage.
  smuts, germination, 451.
  southern, established from seed, first year's root production, 535.
  turf, effects of drought, temperature, and nitrogen, 658.
  varieties for Montana, Mont. 439.
  winter survival in fall sown plats, 659.
Grasshopper, differential, egg, changes in density and weight during development, 708.
Grassland—*see also* Grass(es) *and* Pasture(s).
  experiments, Me. 306.
Grazing—*see also* Range(s).
  association, operation, 735.
Great Plains, northern, in a world of change, 739.
Greenhouse—
  leaf tier, effect of tartar emetic on, 573.
  soils, fertility control in, Mich. 418.
  thrips, banded, host plants of, 561.
Grouse, blue, food habits, 90.
Guavas, dehydration of, 398.
Guayule—
  areas, climatic types, 288.
  crown rot, root rot, and other diseases, U.S.D.A. 74.
  diseases in California, U.S.D.A. 74.
Guayule—Continued.
  diseases in Southwest, U.S.D.A. 74.
  machinery problems in production, 377.
  morphology and anatomy of, U.S.D.A. 316.
  susceptibility to *Phymatotrichum* root rot, U.S.D.A. 74.
Guinea fowls, infection with Rous sarcoma virus and accompanying variations of virus, 731.
Guinea pig(s)—
  body weight relation to endocrine glands, 199.
  immunization against *Brucella* infection, 478.
  nutrition of, 103.
  strain, silvering in, 433.
Gyroceras celtidis on leaves of *Celtis* in Palestine, 558.
Gyrophragmium, North American species, 639
H^+ toxicity to soil bacteria, cause, 176.
Haemaphysalis—
  bispinosa, experimental infection with *Rickettsia burneti*, 113.
  leporis-palustris, *see* Rabbit tick.
Haematopinus adventicius, *see* Hog louse.
Haemonchus contortus—*see also* Stomach worm(s).
  larvae recovery, efficiency of Baermann apparatus in, 101.
  male genitalia of, musculature, 112.
  outbreaks, treatment with phenothiazine, 587.
  preparasitic stages, overwinter survival on pasture, 366.
Halogens in organic compounds, determination, 6.
Halogeton glomeratus, poisonous to sheep, 364.
Halotydeus destructor studies, 562.
Hamster(s)—
  golden, nutrition of, 348.
  susceptibility to peripheral inoculation of encephalitis viruses, 251.
Harvesting methods, Miss. 439.
Hawaii Station report, 508.
Hay—*see also specific kinds*.
  baled, device for sampling, 54.
  crops, emergency, suggestions for, N.Y. State and Cornell 307.
  crops, supplementary, N.J. 437.
  curing and storage, trends in, 491.
  drying with forced ventilation, 491.
  early-cut, curing on tripods, Mich. 536.
  harvesting methods, newer, on Ohio farms, 735.
  hauling, buck rake performance in, Ohio 733.
  production with less labor and power. 489.
  studies, Wis. 617.
Health—
  facilities, rural, of Lewis Co., Mo. 602.
  poor, of rural people of Central America and southwestern United States, 764.
  practices, family, in Dallas Co., Mo. 751.
  problems in pest control poisons, 564.

Health—Continued.
  public, relation to insecticides, pest control agents, and spray residues, 563.
  vitamins, food, treatise, 262.
Heat, *see* Temperature.
Heifers—*see also* Cow(s).
  dairy, raising, cost and advisability of, Md. 387.
  initiation and maintenance of lactation in, by hormone administration, 203.
  war emergency plans for raising, 247.
Helicocephalum diplosporum n.sp., discussion and description, 236.
Heliothis—
  armigera, see Bollworm *and* Corn earworm.
  virescens, see Tobacco budworm.
Helminth parasites of sheep in southwest Virginia, Va. 365.
Helminthosporium—
  allii cause of garlic bulb canker, 319.
  blight resistant barley varieties and strains, 551.
  turcicum leaf blight of corn in Guatemala, 687.
  turcicum relation to corn leaf blight, 324.
Hemerocampa leucostigma, see Tussock moth, white-marked.
Hemicelluloses of forage plants, 17.
Hemiptera associated with ironweed, 339.
Hemlock—
  and beech forest, virgin, on Allegheny Plateau, soils in, 25.
  borer, relation to dying hemlock trees in northern Michigan, 538.
  mortality, causes in northern Michigan, 538.
Hemonchosis outbreaks, treatment with phenothiazine, 587.
Hemophilus influenzae suis and swine influenza virus, synergistic action on chick embryo, 590.
Hemorrhages, brain, in choline-deficient rats, 613.
Hemp—
  an Illinois war crop, 60.
  characteristics, culture, and handling, U.S.D.A. 60.
  nettles, and related plants, N.Dak. 306.
  program, Government's wartime, organized seed treatment and seed conservation, U.S.D.A. 681.
Hen(s)-
  laying—*see also* Egg production.
    bluegrass as pasture, spring v. mature, 351.
    breeding for low fecundity in, 199.
    rations, corn and wheat as main part, 244.
    types of houses for, Ala. 723.
  ovarian function relation to avidin in oviduct, 201.
  Rhode Island Red, effect of increased light on progress of molt and egg production, 583.
  with single kidney, compensatory hypertrophy of, 351.
Hercinothrips femoralis, see Greenhouse thrips, banded.
Heredity of—
  brittle rachis in barley, 194.
  cyanogenetic glucoside and its hydrolyzing enzyme in white clover, 652.
  efficiency in iron utilization in soybeans, 652.
  egg production in poultry, 199.
  fleece weight in range sheep, 198.
  foxes, degree of silvering in, 704.
  lettuce seed color, 527.
  mutant character in wheat stem rust fungus, 652.
  oil glands in Pima cotton, 527.
  parrot mouth in sheep, 44.
  pigmented wool, 432.
  varietal differences of vitamins C and A in potatoes, 652.
Herpetomonas leptocoridis in alimentary canal of boxelder bug, 94.
Hessian fly—
  resistance in Dawson wheat, genetic factors for, 575.
  resistant varieties and hybrids of hard red winter wheat, tests, 541.
Heterakis gallinae, removal from chickens, efficacy of phenothiazine and nicotine-bentonite for, 119.
Heterodera—
  marioni, see Root knot nematode.
  schachtii—
    in southwestern Ontario, problems concerning, 707.
    pattern of distribution in Lambton Co., Ontario, 707.
    resistance of potato varieties to, 690.
  spp. identification by larval length, 703.
Heterosis, controlled, for forage crop improvement, 652.
1,5-Hexadiene-3-ol, dehydration to 1,3,5-hexatriene and 1,3-cyclohexadiene, 276.
Hexamita sp. from ringed-neck pheasant transmissible to turkeys, 594.
Hibiscus rosa-simensis, leaf spot, 221.
Histamine and histaminase reaction, oxygen consumption during, 148.
Histidine, polarographic behavior, 16.
Histomoniasis in broilers, 371.
Hog cholera—
  associated with swine influenza, 366.
  crystal violet vaccine against, 591.
  prevention, and care of swine following vaccination, Mo. 485.
  virus preservation by desiccation under high vacuum, 727.
Hog louse effect on pork production, Mo. 482.
Hogs, *see* Pig(s) *and* Swine.
Holly—
  leaf miner, biology, 466.
  leaf miner, control, 466.
  leaf structure and transpiration in, 36.
Homadaula albizziae on mimosa, description, 238.
Home economics—*see also* Household.
  and agriculture, cooperative extension work in, report, U.S.D.A. 268.

- Homogenization, centrifugal test for measuring thoroughness, 247.
- Homoptera associated with ironweed, 339.
- Honey, Michigan, marketing, Mich. 601.
- Honeydew-melon anthracnose, role of packing methods in increase on fruits, 85.
- Hookworms, cattle, phenothiazine in treatment, Miss. 116.
- Hop—
  - culture in New York State, N.Y.State and Cornell, 310.
  - downy mildew, epidemiology and control, N.Y.State 330.
  - *Verticillium* wilt, control, 330.
- *Hoplocampa testudinea* life history and habits, 577.
- Hormone A′, a male-secreted activator of hormone A, 34.
- Hormones—
  - application of absorption spectra to study, 13.
  - chemistry of, 755.
  - interstitial cell stimulating, from sheep pituitary glands, characteristics, 277
  - plant, *see* Plant growth substances.
  - seed treatment with, crop response to, 535, Mich. 535.
  - sex, effect on erythrocyte number in poultry blood, 203.
  - sex, effect on skeletal development in animals and man, 305.
- Horse(s)—
  - breeding performance in, relation to ascorbic acid, 106.
  - curly coat of, 431.
  - effects of various intravenous injections, on, 728.
  - fate of phenothiazine in, 586.
  - immunized with sheep pituitary gland extract, progonadotropic and aspecific effects of serum of, 201.
  - joint lesions in, and vitamin A deficiency, 367.
  - Morgan, Bennington, and Artemisia, progeny of, 198.
  - Percheron geldings, effect of work on calcium and phosphorus retention, 350
  - poisoning by cacao products, 361.
  - resting energy metabolism and pulmonary ventilation in, 578.
  - seasonal anthelmintic treatment, 729.
  - sensitive fern poisoning in, N.H. 368.
  - sulfanilamide treatment, dosage and tolerance, 249.
  - worm parasites in large stud of, 118.
- Horsefly control incidental to mosquito control, 338.
- Housefly—
  - insecticides for, small chamber method for testing effectiveness, 565.
  - vaporized contact insecticides for, testing by settling mist method, 564.
- Household—
  - economics and management, research in, 509.
  - equipment and management, relation, Miss. 510.
- Housing—
  - and attitudes toward housing in rural Pennsylvania, Pa. 751.
  - cooperative, bibliographical review, 268.
- Huckleberries, dehydration of, 397.
- *Hyalomma aegyptium impressum* attachment to mucous membrane of mouths of cattle, 346.
- Hybridization—*see also* Plant breeding *and specific animals and plants.*
- Hydrogen-ion concentration measurements, reproducibility with glass electrode hydrogen-ion meters. 159.
- Hydrogen-sulfide poisoning studies, 724.
- Hydrologic data, Federal sources of, 628.
- Hydrologic studies, U.S.D.A. 289.
- Hydronephrosis in swine, 117.
- Hydrophobia, *see* Rabies.
- Hydropsychidae of Minnesota, 569.
- Hymenoptera, parasitic—
  - oosorption and ovulation in relation to oviposition, 100.
  - susceptibility to sulfur, 706.
- *Hypera*—
  - *brunneipennis,* studies, 91.
  - *postica, see* Alfalfa weevil.
- Hyphomycetes, capturing and consuming nematodes, 551.
- *Hypodectes chapini* n.sp. from red-shafted flicker, 101.
- *Hypoderma lineatum, see* Cattle grubs.
- *Hypolixus truncatulus* parasite, biology, 717.
- *Hypomyces solana f. cucurbitae,* dual phenomenon and sex in, 654.
- Hypophysectomy, effect on arginase activity of rat livers, 201.
- Hypophysis, *see* Pituitary(ies).
- Hypoxanthine specificity for *Phycomyces,* 642.
- Ice cream—
  - Minnesota Babcock method applied to, 623.
  - mixes, methods of standardizing, Calif. 248.
  - mixes, wartime, cereal substitutions for milk solids, 249.
  - stabilizer, quince seed extract for, 585.
  - victory, with oat and wheat flour, 358.
- Ichneumonid parasite, new, of amaranthus stem weevil, biology, 717.
- Idaho Station—
  - notes, 511.
  - publications available for free distribution, Idaho 617.
  - report, 616.
- Illinois Station notes, 407.
- Illinois University notes, 407.
- Index numbers of production, prices, and income, Ohio 128, 779.
- Indiana Station notes, 270, 407, 618.
- Indiana Station report, 778.
- Industrial wage policies and farm price parity, 381.
- Industry, nutrition in, 766.
- Infantile paralysis, *see* Poliomyelitis.
- Infants—*see also* Children.
  - vitamin B_1 requirement, relation to thiamine in milk preparations, 772.

Influenza, equine, blood picture in, 729.
Inheritance, *see* Heredity.
Ink, printing, *Penicillium* affecting, 292.
Inorganic compounds, purified, for use in spectrographic standards, preparation, 513.
Insect(s)—*see also* Entomology.
  associated with ironweed, 339.
  attached to leaves, collecting and storing without pressure, method, 707.
  bacteria associated extracellularly with, catalog, 90.
  behavior to various wave lengths of light, 337.
  British, generic names, 707.
  color perception in, 337.
  control in home vegetable garden, N.J. 562.
  control, use of entomogenous fungi in, 238.
  damage to timber prevented by proper care, Miss. 779.
  destructive to food in the home, Mo. 463.
  eggs, speed of development at constant temperatures, 90.
  flying, chemotropic responses, apparatus for testing, 337.
  forest, *see* Forest.
  freezing, 338.
  garden and vegetable, in Iowa, control, 707.
  garden, wartime control, Miss. 463.
  grain-infesting, oviposition, effect of crowding, 338.
  group behavior to colors, 707.
  household, insecticidal smokes for, 567.
  in flour and grain, killing by induction heating, 92.
  injurious, control, place of research in, 338.
  invaders, 90.
  larvae, new killing fluids for, 337.
  lipid nerve sheaths in, probable relation to insecticide action, 237.
  of Guam, 562.
  of stored food products, Calif. 563.
  of stored products, pyrethrum aerosol tests against, 707.
  of stored wheat and wool, 562.
  orders in grassland habitats near Hays, Kansas, 338.
  pests, biological control, 562.
  pests of New York, N.Y.State 572.
  Pest Review, Canadian, 338.
  population summary of Kansas, 338, 562.
  scale, *see* Scale insects.
  shade tree, and protective concealment in military areas, 561.
  stored-tobacco, survey of carriers for, 563.
  undercooling and freezing, 561.
  vectors, studies, 562.
Insecticidal smokes for household insects, 567.
Insecticides—*see also* Spray(s) *and specific forms.*
  analyses, Me. 214, N.J. 92, 214.
Insecticides—Continued.
  and disinfectants, official specifications of N. A. I. D. M. 564.
  arsenical and nonarsenical, experiments with, 564.
  contact, method for comparing toxicity, standardizing, 237.
  new potential, 564.
  plants for, U.S.D.A. 679.
  recommendations for more discriminating use, 563.
  relative toxicity, 92.
  testing, Peet-Grady method, 564.
  use, tree and fruit injury and spray residue removal as related to, 563.
  vaporized contact against houseflies, settling mist method for testing, 564.
  wartime formulas, 92.
Insemination, artificial—
  of dairy cattle, Ohio 655.
  schedule, S.C. 617.
Institution management, research in, 509.
Insulin hypoglycemia in pigs, experimental, 117.
Inter-American Conference of Agriculture, Second, final act, 269.
Invertase activity in identical mixtures in liquid and frozen state, 280.
Iodine compounds, quantitative decomposition by lime-fusion method, 6.
Iodocasein, thyroactive—
  effect on growth of mice, 306.
  growth-stimulating effect on chicks, 351.
Iowa State College of Agriculture and Mechanic Arts, history, 754.
Iowa Station report, 508, 616.
Ipomoea, photoperiodic aftereffects in, 192.
Iridomyrmex humilis, see Ant, Argentine.
Iron—
  colorimetric determination with terpyridyl and bipyridyl, 5.
  dimethyl dithiocarbamate as possible substitute for bordeaux mixture, U.S. D.A. 74.
  hemoglobin, absorption of, 769.
  in peanut butter, 395.
  oxides, free, in soil colloids, determination, 162.
  requirements of heterotrophic bacteria, 32.
  spectrophotometric determination, 5.
  volumetric determination, 5.
Ironweed—
  Diptera associated with, 97.
  insects associated with, 339.
Irrigation—
  by sprinkling, Calif. 487.
  companies, consolidation, as aid in water conservation, Utah 598.
  development and area adjustment in Great Plains, 381.
  garden, studies, 373.
  practices, improved, effect on production, 373.
Isachne lutaria n.sp., description, 292.

Isocitric acid, identity with crassulacean malic acid, 16.
Ixodes mexicanus and *I. tancitarius*, new Mexican ticks, 346.
Ixodiphagus caucurtei in Great Britain, 577.
Japanese beetle—
  attractiveness of certain plant constituents to, 571.
  biological control, 95.
  larvae in Delaware, colonization of milky disease of, 241.
  methyl bromide fumigation schedules against, 565.
  on the Niagara frontier, 707.
  situation, 91.
Jassus indicus vector of sandal spike disease, 703.
Jerusalem-artichoke(s)—
  d-lactic acid fermentation, 156.
  sirup, production, 156.
Juniper, reaction to artificial shade and supplemental watering, 545.
Kakimia utahensis n.sp., description, 464.
Kansas College, notes, 143, 407.
Kansas Station, notes, 143, 407.
Kentucky Station notes, 407, 618.
Kentucky University notes, 618.
Keratins, nutritive value, 582.
Kidney—
  effect of feeding urea to steers, 348.
  single, in a hen, compensatory hypertrophy, 351.
  worms in swine, control, S.C. 617.
Kjeldahl digestion method using perchloric acid, 3.
Kok-saghyz, *see* Dandelion, Russian.
Labor—*see also* Agricultural labor.
  hired, importance to Oklahoma agriculture, Okla. 122.
  organized, and farmers, 381.
  relation to land resources for wartime production, U.S.D.A 262.
  scarcity, farmers' means of combating, 381.
  scarcity, serious problem for 1943 production goals, Utah 130.
  supply, war, and farm production in eastern Kentucky, Ky. 744.
Laboratory, emergency use of, during war, Mich. 584.
Lactic acid—
  bacteria, interrelations of pyridoxine, alanine, and glycine in their effect on, 185.
  derivatives, pyrolysis, 409.
  fermentation, effect of pH on, 18.
Lactobacillus casei, growth stimulating substances for, 279.
β-Lactoglobulin crystals, hydration, 278.
Lactose and its hydrolysis products, effect on absorption of calcium, 137.
Ladybeetles of Koebele collection, 468.
Ladyslippers, native, germination and seedling development, 294.
Lagenaria siceraria, use in Hawaii, 92.
Lamb—
  cured, for varying farm family menu, Okla. 132.
  curing methods for farm family use, Okla. 500.
  production from ewes and rams of different breeds, N.Mex. 719.
Lambs—
  birth weight, effect of sire on, 301.
  castrating and docking, U.S.D.A. 471.
  early, shearing in summer, benefits from, N.C. 471.
  fattening on sugar beet byproducts and other home-grown feeds, self-feeding methods for, Wyo. 105.
  Karakul, pelt thickness and fur characters, relation to ear measurements, 350.
  management for promoting good growth, N.Dak. 348.
  shorn and in wool, feeding, 349.
Land—
  boom controls, 740.
  classification for conservation farming, U.S.D.A. 25.
  classification in Blair Co., Pa. 735.
  classification in Waldo Co., Me. 735.
  conditions on Farmersburg-McGregor project in Iowa, U.S.D.A. 170.
  county, selective selling and leasing in North Dakota, 735.
  in relation to labor in wartime production, U.S.D.A. 262.
  irrigable, use in Reservation Area of Uinta Basin, Utah 383.
  market developments and the war, 381.
  market regulations, 381.
  people, and farming in an urban zone, R.I. 752.
  policy, desirable wartime, 381.
  policy for the Americas, U.S.D.A. 142.
  survey in Iowa, Tama Co., U.S.D.A. 632.
  survey in South Dakota, Brown-Marshall soil conservation district, U.S.D.A. 632.
  tenure—
    collective, on grazing areas in Montana, Mont. 200.
    committee, North Central regional, work and plans, 381.
    ideal, 734.
    in Mexico, 381.
    policy goals, 735.
    research project, regional, organization and objectives, 381.
    status of new-ground settlers in Louisiana, 735.
  use and plant succession in Coon Valley, Wisconsin, 524.
  use and policy in northern plains, war developments in, 381.
  use in marginal area, W.Va. 743.
  use in New Hampshire summer homes and rural economy, N.H. 602.
  values and transfers in North Dakota, N.Dak. 382.

- Lanthionine, quantitative determination, 162.
- Larch—
  - canker and dieback, role of *Dasyscypha willkommii* in production, 558.
  - Japanese, susceptibility to deer browsing, 73.
- *Laspeyresia leguminis* n.sp., description, 97.
- Lead—
  - arsenate in soil, effect on vegetables, 563.
  - arsenate, physiological and nutritional aspects of spray residue problem related to, 563.
  - arsenate substitute, cryolite as, 463.
  - copper, and zinc, separation, with salicylaldoxime, 161.
  - lethal dose for cow, 253.
  - storage, effect of arsenates, 707.
- Leaf(ves)—
  - analysis as guide to soil fertility, 298.
  - mesomorphic, role of epidermis and its relation to minor venation, 430.
  - smears, Colchicine-Feulgen, 651.
  - starving, metabolism of, 297.
  - transpiring, supply of water to, 36.
- Leafhoppers—*see also special hosts.*
  - of genus *Empoasca*, host plants, biology, and feeding habits, U.S.D.A. 711.
  - of Minnesota, Minn. 570.
  - vectors of Pierce's disease of grapevine, Calif. 698.
- Legume(s)—
  - broad-headed bugs as pests, 569.
  - classification, relation to anatomy and cytology, 429.
  - establishment and growth on eroded and uneroded sites, 660.
  - for needed N supply, Miss. 439.
  - forage, seed treatment for damping-off control, U.S.D.A. 74.
  - inoculants, inspection, Ind. 290, N.J. 66.
  - inoculation, benefits from, Ohio 54.
  - inoculation by nodule bacteria, 186.
  - species relations in, shown by electric mobility curves, 191.
  - weevil status in Yuma Valley, Arizona, 91.
  - winter, early turning, for cotton and corn, Miss. 204.
  - winter survival in fall sown plats, 659.
- Lemons—
  - coloring in storage, measurement of concentrations of gases for, 34.
  - Eureka, anatomy and histology, 70.
  - susceptibility to *Phytophthora citrophthora,* 699.
- Lend-lease shipments and British food situation, U.S.D.A. 127.
- Lepidoptera associated with ironweed, 339.
- *Lepidosaphes beckii, see* Purple scale.
- *Leptocoris trivittatus, see* Boxelder bug.
- Leptospirosis—
  - active immunization of dogs against, 368.
  - in rats in and about Washington, D. C., 706.
- *Leptothorax,* subgenus *Goniothorax,* first record in United States and description of new species, 577.
- Lespedeza—
  - and small grain rotation in Missouri, efficiencies of, 534.
  - as cover crop, effect on leachings from Dunmore silt loam, Va. 520.
  - as source of riboflavin for chicks, S.C. 617.
  - deficiency symptoms and chemical composition, relation to fertilization, 60.
  - Korean, and alfalfa in grass mixtures, changes in proportion and yield, 52.
  - Korean, seed as protein supplement in chick rations, Mo. 472.
  - seed and hay yields, effect of phosphate and lime, Miss. 439.
- L. D. 50 (lethal dose)—
  - determination and sampling error in bio-assay, 510.
  - or fifty percent endpoint, table determining, 510.
- Lettuce—
  - experiments at Conservancy District Substation, N.Mex. 214.
  - flowering, increased earliness through vernalization, 667.
  - head, nutritional relation of boron and indoleacetic acid in, 667.
  - head, time-of-planting tests, N.Mex. 311.
  - lactic acid fermentation of, organisms found in, 18.
  - nematodes on, in New York, U.S.D.A. 681.
  - seed color, inheritance of, 527.
  - seedlings, growth correlation in, effects of growth substances, 310.
- *Leucocytozoon*—
  - *smithi* in turkey poults, 487.
  - sp. from turkeys in California, 487.
- *Leuconostoc dextranicum* types, causing gum formation in sugarcane juice, 691.
- Leucosis, fowl—
  - propagation in chick embryos by intravenous inoculation, 730.
  - studies, S.C. 617.
  - transfer to chick embryo, 254.
- Library service, public, of Iowa, needs of, Iowa 131.
- Lice, *see* Hog louse, Louse, Poultry Lice, Sheep louse, *etc.*
- Light—
  - of various wave lengths, behavior of insects to, 337.
  - recorder, simplified integrating, for field use, 38.
- Lignin determinations in citrus woods, 157.
- *Lilium*—
  - aneuploids in, 655.
  - spp., haploid-diploid twin embryos in, 654.
  - *tigrinum,* polyploidy in, nature of, 197.
- Lima beans, *see* Beans, lima.
- Lime, agricultural, analyses, N.J. 31.
- Lime-sulfur stability during dipping, 590.
- Liming materials, analyses, Conn.[New Haven] 185.
- *Limonius agonus, see* Wireworm, eastern field.

- Linen fabric, effect of various storage conditions, 615.
- Linseed oil—
  - iodine number, effect of climate, U.S.D.A. 168.
  - paints, drying material in, 155.
  - soap, new lure for melon fly, 715.
- Lipins, chemistry of, 755.
- *Lipoptena depressa*, parasite of Columbian black-tailed deer, life history and morphology, 575.
- Lipoxidase, specificity, 146.
- Listerellosis studies, 364.
- *Listeria* infection, bovine abortion apparently due to, 115.
- Lithium, polarographic determination, 3.
- Liver(s)—
  - arginase activity, effect of adrenalectomy and of adrenocortical steroids on, 532.
  - cirrhosis and choline, 361.
  - disturbances, bovine, economic and nutritional importance, 361.
  - effect of feeding urea to steers, 348.
  - fatty, in mice and sensitivity to exogenous oestrogen, 436.
  - fatty, in pigs, and pyridoxine deficiency, 591.
  - fluke in cattle, hexachloroethane for control, 363.
  - fluke, number of cercariae developing in snails infected with a single miracidium, 463.
  - fluke, route of migration in definitive host, 250.
  - of sheep, cattle, and pigs, vitamin A in, 770.
  - pantothenic acid in, microbiologic assay, 624.
  - riboflavin content, factors affecting, 401.
- Livestock—*see also* Animal(s), Mammals, Cattle, Sheep, *etc.*
  - association, cooperative, administration and operation, 735.
  - diseases, *see* Animal disease(s) *and specific kinds.*
  - feed consumption by, national supply and utilization, U.S.D.A. 390.
  - feeding, handbook, U.S.D.A. 102.
  - feeding stuffs, United Kingdom rationing system for, 496.
  - in wartime Britain, 101.
  - labor and material requirements for, Fla. 745.
  - labor requirements, U.S.D.A. 385.
  - market at Knoxville, facilities and agencies, Tenn. 388.
  - marketing in Corn Belt region, S.Dak. 600.
  - marketing in South Dakota, summary, S.Dak. 125.
  - number and value on farms, Okla. 382.
  - nutritive requirements, Mo. 469.
  - poisoning—*see also* Plants, poisonous, *and specific animals and plants.*
    - by cacao products, 361.
    - in Connecticut, Conn.[New Haven] 482.
- Livestock—Continued.
  - production in war program, responsibility of research workers in, 101.
  - railroad facilities for handling at shipping points in Corn Belt, U.S.D.A 496.
  - rations for, Mo. 103.
  - relation to poisonous plants, Md. 482.
  - statistics, *see* Agricultural statistics.
  - truck mileage, reducing, Minn. 741.
  - trucks in Illinois, market and return loads hauled by, Ill. 261.
- Locust, Australian plague—
  - analysis of outbreaks, 1937–39, 93.
  - control, 562.
  - studies, 562.
- Log—
  - and stumpage prices for 1941, U.S.D.A. 221.
  - rules, empirical, according to species groups and lumber grades, 548.
- *Longia*, North American species, 639.
- Louisiana Station report, 779.
- Louse (lice)—*see also* Hog louse, Poultry lice, Sheep louse, *etc.*
  - body, and man in wartime, bibliography, U.S.D.A. 710.
  - body, infesting clothing, methods and equipment for fumigation, 710.
  - body, toxicity of common fumigants to, 465.
  - crab, on soldiers, tests of mixtures against, 94.
  - head, on children, tests of mixtures against, 94.
- *Loxostege sticticalis*, *see* Webworm, beet.
- Lumber, *see* Timber *and* Wood.
- Lumpy jaw—
  - in muskrat, 369.
  - or actinomycosis, U.S.D.A. 482.
- Lunches, hot, effect on nutritional status of school children, S.C. 612.
- Lungworm of mountain sheep, 366.
- Lupeol isolation from Osage orange, 282.
- Lupines, *Botrytis* disease of, 227.
- *Lyctus brunneus*, timber treatment with boric acid for protection against, 571.
- *Lygus*—
  - bugs attacking many crops, Utah 569.
  - *pratensis oblineatus*, *see* Tarnished plant bug.
- Lymphogranuloma venereum in mice, 482.
- Lymphomatosis—
  - in turkeys, Calif. 593.
  - ocular, studies, 730.
- Lysimeter studies, S.C. 617.
- Lysine, studies, 148.
- Macadamia, oil formation and accumulation in, process, 218.
- Macaroni color, constancy of rank of durum wheats in, 665.
- Machinery, *see* Agricultural machinery.
- *Macrophomina phaseoli* causing cotton root rot in Punjab, 824.
- *Macrosiphum*—
  - *pisi*, *see* Pea aphid.
  - *puyallupsi* n.sp., description, 464.
  - *solanifolii*, *see* Potato aphid.

Madrona stem cankers, 235.
Magnesium—
  agricultural, domestic sources, 184.
  deficiency—
    in Massachusetts apple orchards, 673.
    incipient, in New York apple orchards, 695.
    newly recognized orchard trouble, N.Y.State and Cornell 313.
  purified compounds, preparation, 513.
  retention in soils, relation to form and rates of additions, 183.
  spectrophotometric determination by titan yellow, 5.
Magnolia, riboflavin in, 296.
Mahogany forests in Florida, possibilities of, U.S.D.A. 545.
Maine Station notes, 619.
Maine Station report, 141.
Maine University notes, 619.
Malaria—*see also* Mosquito(es) *and Anopheles.*
  avian, experimental attempts to infect man with, 98.
  avian species, duck as host for, 119.
  control in defense areas, 98.
  duck, activity of sulfonamides in, effect of para-aminobenzoic acid, 482.
  human, symposium, 98.
  in turkeys, description, 487.
  susceptibility to, effect of biotin, 586.
Malic acid, crassulacean, identity with isocitric acid, 16.
Mallow, curled, growth and composition, 663.
Malnutrition and disease, factors involved in struggle against, 764.
Malt—
  analysis standardization committee, report, 165.
  diastase activity, effect of inorganic plant nutrients, 151.
  evaluation as flour supplement, 8.
  proteolytic activity, determination of optimum pH for, 165.
Mammals—*see also* Animal(s) *and specific kinds.*
  extinct and vanishing, of Western Hemisphere, 89.
  of eastern United States, 704.
  preservation, international treaties and agreements for, 89.
  seed-eating, winter food productivity of agricultural land for, 89.
Mammary gland(s)—
  development in hypophysectomized rats, hormonal requirements for, 203.
  in hypophysectomized rats, stimulation by oestrogen, 204.
  normal bovine, effect of chemotherapeutic agents, 362.
  perfused, use of β-hydroxybutyric acid by, 247.
  tissue, lipolytic activity, 475.
  tissue of rat, lactation activity, chemical composition and in vitro metabolism, 656.
Man—
  and animals, brucellosis in, 586.
  parasites of, in temperate climates, 463.
Manganese—
  deficiency disorder of tung trees, control, 700.
  in milk, 357.
Mange, effect on pork production, Mo. 482.
Manpower—
  for cooperative food processors, need for, U.S.D.A. 748.
  in agriculture, 740.
  reserve on farms in Kentucky, and wartime migration, 750.
  rural, loss to war industry through migration, Wash. 262.
Mantidae of Texas, 93.
Mantis, Chinese, oothecae of, studies, 340.
Mantis religiosa, biology, 91.
Manure(s)—
  a wartime fertilizer, W.Va. 522.
  analyses, N.J. 31.
  artificial, use of organic materials for, 522.
  farm, value and methods of handling, Mo. 290.
  value and proper conservation and use during wartime, 633.
  value for crops and pastures, Miss. 419.
Maple(s)—
  diseased, in Massachusetts, U.S.D.A. 681.
  sap, field analysis, and testing of young trees, N.H. 281.
Marasmius perniciosus cause of cacao witches' broom disease, 88.
Marbut, C. F., soil scientist, life and work, 289.
Mare, duration of gestation in, significance, 655.
Margarine, report on, 757.
Market—
  gardens, *see* Truck crop(s).
  reports, U.S.D.A. 129, 390.
Marketing—*see also special products.*
  agricultural products, impact of war on, 381.
  cooperatives of Kansas and Oklahoma, wartime supply operations, U.S.D.A. 748.
Marshes, salt, diking for sand fly control, 715.
Martens, gestation period shortened by increasing length of day, 51.
Maryland Station notes, 619.
Maryland Station report, 509.
Massachusetts Station report, 509.
Mastitis—
  bacteria in milk, Hotis test for detection, U.S.D.A. 588.
  cell content and electrical conductivity of milk as criteria, 253.
  chronic, N.Y.State 483.
  chronic, clinical symptoms, relation to *Streptococcus agalactiae*, 362.
  chronic, modified Whiteside test for detection, 116.
  control, Idaho 589.

- Mastitis—Continued.
  - herd management and control, N.Dak. 116.
  - infectious, Mich. 589.
  - modified Whiteside test for, nature of material in milk responsible for, 356.
  - streptococcic, treatment with tyrothricin, 253.
  - studies, Utah 482, 483.
  - Sulvetil, new treatment for, 253.
  - summary, Calif. 727.
- Mathematical correlations of biological data, validity, effect of unknown factors, 779.
- Meals for industrial workers, planning, U.S.D.A. 766.
- Mealybug—*see also specific host plants.*
  - Comstock—
    - fungus disease, in apple orchards, 237.
    - new hymenopterous parasites of, 100.
    - on apples and peaches in New Jersey, 569.
  - on coffee and other crops in Kenya, biological control, 711.
- Meat—*see also* Beef, Lamb, Pork, *etc.*
  - canning N.J. 761.
  - curing and packaging to increase locker capacity, 606.
  - dehydration, 263.
  - inspection, Federal, in wartime, 724.
  - juiciness, mechanical determination, 499.
  - marketing methods, 579.
  - preservation by freezing, N.J. 604.
  - products, soybean flour in, determination, 8.
  - samples, preparation for histological study, 718.
- Mediterranean fever, *see* Undulant fever.
- *Melanophila*—
  - beetles, attraction by fire and smoke, 562.
  - *fulvoguttata, see* Hemlock borer.
- *Melanoplus differentialis, see* Grasshopper, differential.
- *Melittia satyriniformis, see* Squash borer.
- Melon fly, linseed oil soap as lure for, 715.
- Melons, new varieties for Puerto Rico, P.R.U. 215.
- *Melophagus ovinus, see* Sheep ticks.
- Mendel, Gregor, and his contributions to development of genetics, 431.
- *Mentha* spp., spindle abnormalities in, 70.
- Mercury—
  - fungicidal action, mechanism, 452.
  - fungicides, poisonous, precautions in use of, 687.
- *Metaphycus psyllidis* n.sp. parasitizing nymphs of tomato psyllid, 464.
- Meteorological observations, 25, 289, 517.
- Meteorology—*see also* Climate(s), Rainfall, Temperature, Weather, *etc.*
  - and related subjects, bibliography, 627.
  - cultural survey, 413.
  - dynamic, methods and problems, 627.
  - in Guatemala, studies, 167.
  - international bibliographies, 166.
  - textbook, 166.
- Methionine—
  - dietary, methyl group of, use by man in synthesis of choline and creatinine, 508.
  - effect on molting period and egg production, 583.
- Methyl α-acetoxypropionate, conversion to methyl acrylate, 409.
- Methyl bromide—
  - as fumigant, 563, 566, U.S.D.A. 565.
  - fumigation schedules against Japanese beetles, development, 565.
- Mice—*see also* Rodents.
  - and rats, latest developments in control, 336.
  - bones, breaking strength, effect of sex and sex hormones, 103.
  - changes in vagina during oestrus and pregnancy, 201.
  - embryos, external features in, development, 304.
  - field, in apple orchards, control, Va. 705.
  - field, tularemia in, 588.
  - flexed-tailed, siderocytes in blood of, 302.
  - genetics of, 528.
  - growth, effect of thyroactive iodocasein, 306.
  - in orchards, control, 462.
  - natural infection of Chagas' disease with, 119.
  - screw-tail, anatomical study, 45.
  - tailless condition in, test for genetic factors as cause, 528.
  - tailless, tests for recombination among lethal mutations in, 433.
- Michigan College notes, 511.
- Michigan Station notes, 271.
- Michigan Station report, 509.
- *Micracinae,* new genera and species, 241.
- Microbe as a biological system, 31.
- Microbiology of upper air, 168.
- *Microbracon vestiticida* parasite of bean weevil, laboratory rearing and life history notes, 346.
- *Microctonus epitricis* abundance in Virginia, 337.
- *Microcycas calocoma,* shoot apex in, zonal structure and growth, 193.
- Micro-organisms—*see also* Bacteria.
  - action of wetting agents on, 291.
  - intestinal, action on ascorbic acid, 282.
- Microscope, electron, treatise, 2.
- Microthyriaceae, South African, revision, 639.
- Microtome, rotary, paraffin compression due to, 286.
- Migration, wartime, and manpower reserve on farms in Kentucky, 750.
- Mildews—*see also host plants.*
  - powdery, association with thrips, 222.
- Milk—
  - absorption of odors by, Mich. 247.
  - and milk products, treatise, 584.
  - and whey powders, spray-dried, manufacture, bacteriological aspects, 110.
  - as a priority food, 757.
  - as sole constitutent in diet of chick, 580.

Milk—Continued.
  assembling and distribution in Harrison Co., W.Va. 496.
  bacteriological quality, microscopic technics for determining, Mich. 475.
  concentrated, Minnesota Babcock method applied to, 623.
  curd tension, relation to gastric emptying time in children, 768.
  delivery, every-other-day, R.I. 126.
  different forms on English markets, relative nutritive value, 757.
  distribution—
    costs in New Jersey, 599.
    in New Orleans, La. 741.
    pre-war developments in, U.S.D.A. 126.
    single service containers for, value, 109.
    trucks, a major item in, Miss. 496.
  effect of heat treatment, relation to baking quality, 22.
  enterprise on upland farms near Douglas Reservoir area, Tenn. 388.
  evaporated v. filled, fed to rats, comparison, 266.
  ewes', ascorbic acid in and effect of ascorbic acid injections, 104.
  examination at dairy plant intake, use of direct reading pH meter for, 247.
  extraneous material in, regulations and practices in determining, 724.
  fat and solids-not-fat in, paying producers for, Wis. 126.
  fresh, rate of bacterial filtration and butterfat concentration during cooling, 475.
  homogenized, centrifugal separation of, Mich. 584.
  homogenized, cooking qualities, 610.
  iodoform flavor in, 110.
  low bacterial count, value of chlorine in producing, 247.
  manganese in, 357.
  market in different Indiana cities, economic data, Ind. 125.
  marketing in Connecticut, efficiency, retail distribution by producers, [Conn.] Storrs 388.
  mastitic, Whiteside reaction in, nature of material responsible for, 356.
  mastitis bacteria in, Hotis test for detection, U.S.D.A. 588.
  methylene blue test, value, 248.
  number of leucocytes in, relation to streptococcus infections of udder, 109.
  Ohio, farm sales through different outlets, 741.
  or fat production of dairy cows, effect of thiamine feeding, 355.
  paper containers for, bacteriological and practical aspects, Ill. 109.
  pasteurization—
    effect on flavor, Mont. 356.
    short-time, 263.
    studies, 110.
  powder, keeping quality, 110.

Milk—Continued.
  preparations, thiamine in, relation to vitamin B_1 requirement of infants, 772.
  production—
    costs and returns, N.C. 495.
    costs and returns, trends in, Ind. 125.
    economy of, effect of dairy merit, body size, and plane of nutrition, Mo. 384.
    effect of spraying cows with repellent type sprays, 108.
    meeting war needs for, by better pastures, Utah 108.
  properties, effect of feeding cottonseed meal v. peanut meal, S.C. 617.
  purchases, effect of every-other-day delivery on, 741.
  skimmed, *see* Skim milk.
  solids, dry, chemical factors affecting baking quality, 23.
  staphylococcal antitoxin in, 727.
  supply of Indiana for different market outlets, Ind. 600.
  transportation—
    Colebrook plan for, N.H. 389.
    from farms to dealers' platforms in Ohio, 741.
    in Stillwater area, Okla. 122, 389.
  trucks assembling, from Indiana producers, wartime transportation survey of, Ind. 126.
  vitamin C in, reduced and total, 775.
Milking enterprise on farms in Ogden area, economic analysis, Utah 737.
Millet(s)—
  Japanese, adaptation for supplementary pasture, 53.
  merits as emergency hay crop, N.Y.State and Cornell 307.
Mills for producing vegetable oils, crushing capacity and estimated crush, U.S.D.A. 749.
Milo grain for fattening steers, U.S.D.A. 348.
Mimosa, ornamental, new pest of, in District of Columbia, 238.
Mineral—
  deficiencies in Northwest, evidence of, 756.
  licks, biological significance of, 230.
  nutrition, 755.
Mink(s)—
  Chastek paralysis from feeding frozen smelt, 368.
  coccidiosis a menace to, 729.
  distemper-infected, treatment with tissue vaccine, 591.
  distemper, tissue vaccine in control, 118.
  mutations in, 303.
  predation upon muskrats, analysis, 705.
  raising, 704.
Minnesota Station notes, 511.
Minnesota Station report, 142.
Minnesota University notes, 271, 511.
Mint, insect control on, 91.
Missouri Station report, 509.

- Mistletoe, American, chlorophyll and photosynthesis in, 429.
- Mites, parasitic, genera and species, 242.
- Mold (s)—
  - antibacterial substances produced by, 33, 291, 639.
  - standards, Government, for butter making, selecting cream for, Mont. 724.
  - vitamin deficiencies of, 641.
  - with antibacterial ability, 33.
- Molybdenum blue reaction, elimination of fluoride interference in, 3.
- *Monilia brunnea* n.sp., description, 89.
- *Monilochaetes infuscans*, notes, 327.
- Monocotyledoneae—
  - origin and trends of specialization of vessel in, 193.
  - vessel specialization in late metaxylem of organs in, 651.
- *Monomorium pharaonis*, *see* Ant, Pharaoh.
- *Montagnea*, North American species, 639.
- Montana College notes, 271, 511.
- Montana Station notes, 271, 511.
- Montmorillonite, positive differentiation from hydrous mica, X-ray diffraction procedure, 174.
- *Morindicola royoc* leaf spot, cause, 702.
- Mosaic disease, *see specific host plants*.
- Mosquito(es)—*see also Aedes, Anopheles, Culex, and* Malaria.
  - accidental transportation by automobile, 562.
  - as vectors of *Dermatobia* in eastern Colombia, 239.
  - control, 562.
  - control, horsefly control incidental to, 338.
  - diurnal resting places in vicinity of Reelfoot Lake, microclimate of, 99.
  - Extermination Association, New Jersey, meeting, papers of, 97.
  - flight range, 338.
  - in Florida salt marshes, diking and pumping for control, 715.
  - light traps, operating, time-saving methods for, 343.
  - malaria, responses to light, 239.
  - of Great Swamp in Rhode Island, status in 1942, 575.
  - of Utah, 239.
  - range of disperson of, 575.
  - salt-marsh, eggs, distribution in Florida, 343.
- Moths of South Africa, 572.
- Motortruck use in Illinois, Ill. 261.
- Mounting medium, method of compounding, 287.
- Mourning dove, ecology and management, Iowa 462.
- Mouse typhoid—
  - basis for genetic resistance to, 528.
  - genetic constitutions of host and pathogen in, 482.
- Mower, horse-drawn, converting into power mower, S.Dak. 490.
- Muck—
  - farmer, service of U. S. Weather Bureau to, 25.
  - soil management for sugar beet production, Mich. 211.
  - soils of Florida Everglades, water control in, Fla. 178.
- Mulches effect on runoff, erosion, and crop yields, S.C. 617.
- *Musca domestica*, *see* Housefly.
- Muscle phosphorylations, role of potassium in, 146.
- Muscoidea, new North American, 99.
- Mushroom(s)—
  - culture, synthetic composts for, preparation, 667.
  - (family Agaricaceae), of Victoria, Australia, key and descriptive notes, 292.
  - mummy disease, Mo. 459.
- Muskmelons, cultural and fertilizer studies, Iowa 541, 542.
- Muskrats—
  - raising, 704.
  - survival, effect of flood and low water levels, 559.
- Mustard oils in crucifers, relation to clubroot resistance, 686.
- Mutation(s)—
  - in minks, 303.
  - spontaneous, and gene variability, 652.
- Mutton tallow, digestive coefficients, 759.
- *Mycobacterium johnei*, infection of laboratory animals with, 587.
- Mycology, industrial, introduction to, textbook, 523.
- Mycorhizae and phosphorus nutrition of pine seedlings in prairie soil nursery, Iowa 449.
- Mycorhizae, process of phagocytosis in, 186.
- *Mycosphaerella musicola*, perithecia production in, soil conditions affecting, 698.
- Myxobacteria, utilization of carbohydrates, 82.
- *Myzus*—
  - *harmstoni* n.sp., description, 464.
  - *persicae*, *see* Peach aphid, green.
- Naphthalene paste, 706.
- Narcissus—
  - bulb nematode, longevity of congelations of, 233.
  - stripe disease, virus agent and spread, 701.
- Nasturtium, nitrate absorption and nitrogen distribution rate in, effect of boron in substrate, 645.
- Naval stations, mosquito control in, 98.
- Nebraska Station notes, 619.
- Nebraska Station report, 779.
- Nebraska University notes, 619.
- *Nectria* spp. associated with diseases of hardwoods, identity and host relations, 703.
- *Nematoctonus*—
  - *leptosporus* n.sp., parasitic on *Bunonema* sp., 450.
  - *pachysporus* n.sp., parasitic on *Rhabditis monhystera* group, 450.

Nematode(s)—*see also* Root knot nematode.
  cattle-parasitic and free-living, control by soil fumigation, 360.
  eggs in decaying bluegrass, new *Helicocephalum* parasitizing, 236.
  from lungs and frontal sinuses of New York furbearers, 119.
  fungi parasitic on, 450.
  new trichostrongylid, from stomachs of American squirrels, 236.
  parasitic in sheep, preparasitic stages overwinter survival on pasture, 366.
Nematodirus spp. preparasitic stages, overwinter survival on pasture, 366.
Neodiprion—
  attacking pines in eastern Canada, 576.
  sertifer control with concentrated lead arsenate sprays, 576.
Nesois in Hawaii, 94.
Nesomartis in Hawaii, 94.
Nettles, hemp, and related plants, N.Dak. 306.
Nevada Station administrative history, 1888–1943, 269.
Nevada Station notes, 271.
New Hampshire Station notes, 780.
New Hampshire Station report, 405.
New Hampshire University notes, 780.
New Jersey Farm Bureau, work of, 754.
New Mexico Station notes, 271.
New Mexico Station report, 509.
New York Cornell Station notes, 271, 511.
New York Cornell Station report, 509.
New York State Station notes, 271, 408, 512.
New York State Station, work of, 142.
New York Stations, notes, 619.
Newcastle disease of fowls, chick red cell agglutination test with, 592.
Niacin—*see also* Nicotinic acid.
  in pork, N.Dak. 401.
Nicotiana—
  effect of different proportions of specific chromosomal complements on size in, 652.
  haploid-diploid twin embryos in, 654.
  induced heteroploids of, 196.
  spp. resistant to *Phytophthora parasitica nicotianae*, 329.
Nicotine—
  and water system, azeotropism in, 145.
  as insecticide, status and future trends, 706.
  silicotungstates, 15.
Nicotinic acid—
  assay, effect of *p*-aminobenzoic acid on, 10.
  effective in protecting pigs from *Salmonella choleraesuis*, 591.
  in blood cells and plasma, determination, 11.
  in cereal products, determination methods, collaborative study, 11.
  in foods, 139.
  in plant material, determination, 164.
  nutrition, evaluation by urinary excretion studies, 613.
  urinary excretion, effect of protein intake of dogs and rats, 139.
Nitrate production, effect of grain-crop residues on soil surface, Nebr. 633.
Nitrogen—
  conservation of night soil in central China, 31.
  determination, Kjeldahl, wet-digestion micromethod, 3.
  fertilizer profitably applied as oats top dress, Miss. 51.
  fixation and assimilation by *Azotobacter*, apparatus for studying respiration in, 33.
  fixation, biological, mechanism, 294.
  in plant tissue, determination, 164.
  metabolism effect of thiamine, riboflavin, pyridoxine, and pantothenic acid deficiencies, 399.
Nitrogenous fertilizer, time and method of applying to Delta soils, Miss. 633.
Nitromethane, recovery from three-component mixture, 145.
Nitzschia closterium, chlorophyll fluorescence and energy transfer in, 649.
Nontronite, chemical and physical properties, Mo. 409.
North Dakota Station notes, 620.
Notatin from *Penicillium notatum*, 186.
Novoxil effect on bovine mammary glands, 362.
Nucleoproteins, ribose- and desoxyribose-, distinction between, 646.
Nudaurelia cytherea capensis, survey and control, 238.
Nursery seedling stock root rots in storage, control, 554.
Nut diseases in Pacific Northwest, U.S.D.A. 74.
Nutgrass eradication and control, Ariz. 444.
Nutrition—*see also* Diet(s).
  and diet in health and disease, 611.
  and physical fitness, 764.
  as factor in geographical distribution of dental caries, 756.
  guide, national wartime, U.S.D.A. 756.
  handbook, 131.
  human, role of amino acids in, 502.
  in blood regeneration, 612.
  in industry, 766.
  in Latin America, 393.
  industrial, manual of, U.S.D.A. 766.
  1941 and 1942, 755.
  of pupils, ideal school program improvements, 767.
  of Virginia people as indicated by diets of school children, Va. 266.
  plant, *see* Plant nutrition.
  program and feeding liberated countries, 765.
  research in, 509.
  survey of small North Carolina community, 766.
  work in Philippines, status, 756.
Nutritional—
  indices for rural and urban school children of Utah, 265.
  status of population group in Madrid, evaluation, 765.

Nutritional—Continued.
  status, thiamine clearance as an index of, 267.
Nutritive requirements, meeting under rationing and other wartime food limitations, 767.
Nysius—
  and allies in Hawaii, 94.
  ericae, see Chinch bug, false.
Oak(s)—
  cork, cynipid in California, 338.
  cork, possibilities in the Americas, 449.
  cross ties, treated, decay resistance, 120.
  ties and posts, untreated, effect of invisible decay on deterioration, 235.
  wounds and decay caused by removing companion sprouts, 235.
Oat(s)—
  and Canada peas as emergency hay crop, N.Y.State and Cornell 307.
  carotene and protein in, at different growth stages, 534.
  chloroplasts, intact, isolation, agglutination and nitrogen analysis, 429.
  chloroplasts, nitrogen content, 299.
  coleoptiles, dehydrogenases of, 425.
  coleoptiles, dehydrogenases of, action of synthetic auxins and inhibitors on, 425.
  disease resistance, breeding for, 225.
  diseases in upper Sacramento Valley, survey, U.S.D.A. 681.
  flour in ice cream mix, 358.
  grown in winter-hardiness nurseries, survival, 60.
  growth and composition, effect of naphthalene acetic acid on, 296.
  hulls, essential factor in, for chick growth, Iowa 473.
  length of dormancy in, relation to after-harvest sprouting, 658.
  milling quality, factors affecting, 663.
  response to different N sources, Miss. 633.
  riboflavin in, 296.
  root rot in England, *Rhizoctonia solani* associated with, 687.
  seedling, growth and metabolism in, relation, 190.
  seedling, N transport and metabolism in, relation, 425.
  spring, adaptation for supplementary pasture, 53.
  straw, accumulation of nitrates in, 206.
  uniformity and variety tests, lattice and lattice square designs with 533.
  varieties—
    and seeding studies, N.J. 51.
    and strains, registration, 206.
    for Montana, Mont. 439.
    for winter pasture production, 60.
    new, N.Dak. 60.
    root development in, 61.
    under varying soil moisture levels, transpiration rate in, 297.
Oceanides in Hawaii, 94.
Ocotillo vegetative and floral growth, 645.
Octadecenoic acids, derivatives of, 276.
Octane-water-air mixture, theoretical, Mollier diagrams for, 120.
Oesophagostomum—
  columbianum preparasitic stages, overwinter survival on pasture, 366.
  radiatum infection in cattle, clinical aspects, 726.
Oestrone—
  isomer of, containing a phenolic B ring, synthesis, 410.
  stereoisomer of, total synthesis, 410.
Office of Experiment Stations—
  notes, 144.
  personnel of, U.S.D.A. 406.
Ohio Station—
  list of bulletins, Ohio 406.
  notes 271.
Oil(s)—*see also* Fat(s) *and specific oils.*
  drying, polymerization, 155.
  edible, chemical characteristics, 132.
  emulsions, home-made concentrated and tank-mix, N.J. 340.
  fields, Oklahoma, tenure arrangements in, 734.
  manometer-manostat to control column throughput, 2.
  mill crushing capacity and estimated crush of vegetables, U.S.D.A. 749.
  recovery from whole cotton, 153.
  sprays, summer-type, petroleum fractions of, efficiency relation to composition, 566.
  vegetable, and butterfat, comparative nutritive value, 758.
  vegetable, bleaching formation of conjugated material during, 278.
Oklahoma College notes, 408.
Oklahoma Station notes, 272, 408.
Okra, pod spot, 221.
Oleo stock, digestice coefficients, 759.
Oleoresin(s)—
  from longleaf and slash pine, *l*-pimaric acid in, 156.
  pine, removal of contaminants from, 156.
Oleovitamin A and D, and cod-liver oil, comparative stability of vitamin A in, 138.
Olives, Spanish-type green, production in California, Calif. 515.
Omphalia flavida, coffee disease due to, 700.
Onion—
  diseases in Massachusetts, U.S.D.A. 319.
  downy mildew, Calif. 85.
  downy mildew in Texas, U.S.D.A. 75.
  maggot control, timing experiment with insecticides used for, 91.
  pink root disease, 86.
  root tips, colchicinized, metaphase stage in, 430.
  roots, treatment with colchicine solution prior to X-irradiation, effect, 650.
  thrips populations, variations in, Ohio 340.
  thrips resistance in relation to leaf structure, 237.
Oospora lactis cultures, optimum temperature of growth, 248.

- *Ophiobolus graminis*-infected wheat, fungi isolated from lesioned roots, effect of biotin and thiamine on growth, 424.
- *Ophiostoma catonianum* and pseudopyridoxine, 641.
- Opossum(s)—
  - hints on care of, 704.
  - natural infection of Chagas' disease with, 119.
  - ovary, normal development and reactions to sex hormones, 203.
- Orange(s)—
  - Jaffa, early diagnosis of blemishes and diseases by ultraviolet rays, 557.
  - juice, soluble constituents and buffer properties, 428.
  - stem end rot, prevention, 232.
  - Valencia, composition of fruit, effect of rootstock, 677.
  - Valencia, differentiating abnormal cells in vesicles, 285, 651.
  - yields, effect of fertilizers, Calif. 447.
- Orchard(s)—*see also* Fruit(s), Apple(s), Peach(es), *etc.*
  - cold damage from freeze of November 1940, 629.
  - fertilizer situation, Calif. 669.
  - grass—
    - chromosomal behavior in, genetical consequences, 41.
    - seed set under bag, heritable variations in, 41.
    - seed set under bag, nonheritable variations in, 61.
  - mice, control, 462.
  - Missouri, damage from freeze of November 1940, 629.
  - mulch fertilizer value, 543.
  - spray residues in Pacific Northwest, sampling studies, 565.
  - tilled v. untilled areas, soil properties, 26.
- Orchid(s)—
  - germination and growth, effects of vitamins, 187.
  - plants, infested, methyl bromide for disinfection, 92.
  - seeds, growth after dehydration from frozen state, 525.
- Orchidaceae, growth of fruits in, 426.
- Organic matter, rate of application, relation to soil aggregation, 175.
- Ornamental plants, shrubs, and trees, *see* Plant(s), Shrubs, *and* Tree(s).
- Ornithine, studies, 148.
- *Ornithodoros*—
  - sp., experimental infection with *Rickettsia burneti*, 113.
  - spp., determination, 482.
  - *turicata* as spirochetal reservoir, 587.
  - *turicata*, fasting and nonfasting, longevity, 482.
- *Oryzopsis hymenoides* and *Stipa viridula*, intergeneric hybrid between, cytotaxonomic study, 196.
- Osage orange, lupeol isolation from, 282.
- *Osmanthus*, new names in 34.
- Osmosis and osmotic pressure, 296.
- Ossification centers, appearance in children, 768.
- *Ostertagia* spp. preparasitic stages, overwinter survival on pasture, 366.
- Otters, raising in captivity, 704.
- Ova of pheasants, quails, chickens, and ducks, growth rates, 305.
- Ovens, combination range, performance of, 508.
- Ovulation following intravenous injection of hormones in fowl, time required for induction, 48.
- Ox warble losses, prevention, Mo. 482.
- Oxidase, lipid, studies, 146.
- Oxygen sag formula, mathematical formulation, 732.
- *Oxypleurites aesculifoliae*, alternation of generations in, 101.
- *Pachyrrhizus erosus* as possible insecticide, 562.
- Pacific mite control with xanthone, 561.
- Pacific Science Association, Pacific Science Congress of, proceedings, 755.
- Pack rat cuterebrid, biology, 467.
- Packing-house byproducts, blood in, determination, 9.
- Paint, linseed oil, drying material in, 155.
- Pantothenic acid—
  - chemistry and biochemistry, 147.
  - deficiency, effect on basal metabolism and respiratory quotient in rats, 504.
  - deficiency, effect on N metabolism, 399.
  - in pollen, 296.
  - in tomato plants, 641.
  - in yeast and liver, microbiologic assay, 624.
- Paper—
  - and paperboards, composition in 1939, U.S.D.A. 318.
  - and pulp mill waste, bacterial flora of, 636.
  - container, single service, for milk dispractical aspects, Ill. 109.
  - containers for milk, bacteriological and practical aspects, Ill. 109.
- Paprika breeding, S.C. 542.
- Paralysis—
  - Chastek, in Oregon mink and foxes caused by feeding fresh frozen smelt, 368.
  - Chastek, on an Alberta fox ranch, from feeding herring, 369.
  - in rats, cure with biotin concentrates and crystalline biotin, 505.
- Parasites of—
  - livestock, dissemination by wild rats, 360.
  - man in temperate climates, 463.
- Parasitism, osmotic and permeability relations in, 79.
- Parasitology—
  - introduction to, 237.
  - laboratory manual, illustrated, 706.
  - medical, 477.
- *Parasynthormon* n.spp., from United States, 467.

Paratetranychus—
  citri, *see* Red mite, citrus.
  sacchari, new, attacking sugarcane, P.R.U. 346.
Parathyroid glands, anatomy of, and relation to calcium metabolism, 485.
Paratrioza cockerelli, *see* Potato psyllid *and* Tomato psyllid.
Paratyphoid infection in quail, 372.
Parents, age, at birth of first child, rural-urban variations in, 752.
Paris green and other stomach poisons as mosquito larvicides, 99.
Parity—
  and progress, 382.
  idea in United States, 122.
  prices, material bearing on, U.S.D.A. 747.
Partridge, Hungarian, in Palouse Region, Washington, 560.
Paspalum genus, interspecific hybrids in, 196
Pasteurella pestis, fate of, in flea, 361.
Pasteurization, *see* Milk.
Pasture(s)—
  and pasture research, lectures on, 54.
  establishment and production, effect of lime and fertilizers, U.S.D.A. 438.
  grass, in Canada, ecological and grazing capacity studies, 204.
  grasses, *see* Grass(es).
  irrigated, in California, 54.
  mixtures, botanical analysis, inclined point quadrat method, 53.
  mixtures for good land and for alkali or seepy alkali soil, N.Mex. 534.
  of Puerto Rico, relation to soil conservation, U.S.D.A. 536.
  permanent, establishing and improving, N.C. 53.
  plants, effect of minor elements, Fla. 437.
  plants, standard common names for, 523.
  production and use, Minn. 659.
  productive, essentials for, U.S.D.A. 536.
  realizing greater returns from, N.C. 439.
  research technic, 347.
  studies, Wis. 617.
  supplementary, adaptation of crops for, 53.
  teart, of Somerset, cause and cure, 347.
  treatment, returns from, Mass. 658.
  typical plains, composition, grazing value, and vegetative changes, 717.
  value of manure for, Miss. 419.
  vegetation, tall prairie grass type, composition and density, evaluating methods, 53.
Patents relating to pest control, U.S.D.A. 92.
Pea(s)—
  aphid—
    constant threat to canning industry, N.Y.State and Cornell 342.
    control, combination rotenone-nicotine blends for, 341.
    control in eastern Virginia, 570.
    control, thiocyanate compounds for, 571.
    physiological races, 338.
    studies, Md. 711.
Pea(s)—Continued.
  Ascochyta blight of, clean seed and crop rotation as preventive, 81.
  Ascochyta blight of, control, 693.
  Austrian Winter, cost and efficiency in producing, Oreg. 386.
  beach, sulfuric acid seed treatment of, 663.
  Canada, and oats as emergency hay crop, N.Y.State and Cornell 307.
  canning, protection of natural green pigment in, 263.
  canning, studies, Wis. 617.
  dehydrated and powdered in several ways, quality, 603.
  diseases in Wisconsin, Wis. 80, U.S.D.A. 681.
  downy mildew of, in Ohio, U.S.D.A. 548.
  emergence, effect of seed treatment, 693.
  field, culture, Wis. 311.
  growing for canning and freezing, U.S.D.A. 67.
  inoculation as source of nitrogen for, N.Y.State and Cornell 311.
  preserved by freezing, texture, 23.
  production and prices by areas, trends of, U.S.D.A. 261.
  root rot diseases, seed treatment for, Colo. 330.
  seed production, relation to zinc, 311.
  seed treatment as crop insurance, 75.
  seed treatment with Spergon, effect, 686.
  shelled, ascorbic acid in, Utah 507.
  shelled green, changes in quality, Md. 507.
  silvery, sulfuric acid seed treatment of, 663.
  thiamine in, effect of freezing and frozen storage, 400.
  transplantation experiments, 189.
  varieties, key to, U.S.D.A. 311.
  varieties needing treatment, 75.
Peach(es)—
  aphid, green, toxicity of cube-vegetable oil dusts to, 340.
  arsenical injury on, 340.
  borer, lesser, in Ontario, 707.
  brown rot control, 231.
  canning costs, effect of size of fruit, S.C. 617.
  Comstock mealybug damage to, in New Jersey, 569.
  cost of drying, Calif. 386.
  dehydrated, methods of drying, storage, and cooking, R.I. 397.
  diseases in Morocco, symptoms and control, 231.
  diseases in Ozark section of Arkansas, U.S.D.A. 74.
  Elberta, seed and fruit development, chemical changes accompanying, 69.
  ethylene dichloride injury to, unusual type, 706.
  large, canning costs, 607.
  leaf curl recorded in California as early as 1852, 75.

Peach(es)—Continued.
- leaf curl, scab, and brown rot, variables in control of, 332.
- leaves, potassium in, effect of soil management, 673.
- mosaic detection, macrochemical reaction for, 697.
- packing, use of ventilated containers for, 216.
- production in Massachuetts, Mass. 314.
- Redhaven, new variety, Mich. 447.
- root knot nematode resistance, inheritance study, 697.
- roots, *Armillaria* attacking, 696.
- rosette mosaic disease, Mich. 87.
- spray residue removal from, U.S.D.A. 669.
- spraying requirements, Miss. 215.
- sulfited, improving quality of preserves made from, 608.
- trees, bearing, pruning methods, 69.
- trees, Halehaven, budded on Shalil and on Carolina natural rootstocks, comparison of performance, S.C. 544.
- trees, performance, effect of commercial fertilizers, Ark. 215.
- trees, young, N, P, and K interrelations in, 28, 215.
- varieties, newer, for south-central Pennsylvania, Pa. 314.
- X-disease, identification and control, N.Y. State 332.

Peachtree borer—
- control, 91, 572.
- control, ethylene dichloride emulsion and paradichlorobenzene crystals for, 466, Va. 342.

Peanut(s)—
- acreages and disease losses in 1942, U.S. D.A. 319.
- as wartime crop in Louisiana, La. 386.
- butter as source of thiamine, Ca, P, and Fe, 395.
- diseases and injuries in Arkansas, U.S. D.A. 74.
- fertilization, Miss. 180.
- for oil, a war crop for farmers, Miss. 61, 204.
- for oil, fertilization, N.C. 439.
- for shortening and for seasoning vegetables, Ga. 500.
- growing, U.S.D.A. 61.
- oil mill crushing capacity and estimated crush, U.S.D.A. 749.
- production, Va. 440.
- production costs and income, Okla. 494.
- production, machinery problems in, 257.
- seed treatment, S.C. 617.
- seed treatment, purpose and method, 325.
- white grub injury in eastern Virginia, 337.

Pear(s)—
- breeding in South, 674.
- cost of drying, Calif. 386.
- dehydrated, methods of drying, storage, and cooking, R.I. 397.
- diseases, causes and control, Wash. 696.

Pear(s)—Continued.
- fire blight control with pollenicides, 232.
- root, vascular differentiation in, Calif. 651.
- spray residue removal from, U.S.D.A. 669.
- spraying requirements, Miss. 215.
- trees, phosphorus deficiency in, 696.

Peat—
- moss, effect on first two seasons' growth of apple and peach trees, 69.
- soils of Florida Everglades, water control in, Fla. 178.
- soils of New York, effect of zinc on productivity, 184.

Pecans—
- as source of vitamin B_1 and B_2, Ariz. 503.
- production, orchard management and cost, U.S.D.A. 218.

Pectinophora gossypiella, see Bollworm, pink.

Pediculoides ventricosus, see Straw itch mite.

Pediculus humanus corporis, see Louse, body.

Pediculus humanus humanus, see Louse, head.

Pedology in service of soil science, 168.

Peeling method, new caustic for fruits and vegetables, 283.

Pelargonium, Madame Salleron, a periclinal chimera, Mich. 219.

Penatin—
- antibacterial substance produced by *Penicillium notatum*, purification and properties, 33, 480.

Penicidin, method of production and preparation from molds, 33.

Penicillia, mucorine parasite on, 76.

Penicillin—
- and tyrothricin, 725.
- large-scale production, 640.
- potency tests, effect of glucose on, 481.
- production, 361.
- resistance of *Staphylococcus aureus* to action of, 249.
- toxicity and efficacy, 115.

Penicillin B—
- an antibacterial substance from *Penicillium notatum*, 480.
- preparation, purification, and mode of action, 480.

Penicillium—
- growth, penicidin as product of, 33.
- *hirsutum*, cause of *Scilla* bulb rot, 319.
- *notatum*—
  - antibacterial substance penicillin B from, 480.
  - notatin from, 186.
  - penatin produced by, purification and properties, 33, 480.
- sp. causing blemishes on printing by ink, 292.
- sp. on Jaffa oranges, early detection by ultraviolet rays, 557.
- spp., antibacterial substances produced by, 291.

Pennsylvania Station notes, 143, 512.

Pepper(s)—
- blight, physiology of, 694.

Pepper(s)—Continued.
    carotene and ascorbic acid in, N.Mex. 774.
    carotene and ascorbic acid in, effect of drying and canning, N.Mex. 503.
    dehydrated, methods of drying, storage, and cooking, R.I. 397.
    experiments at Conservancy District Substation, N.Mex. 214.
    pimiento, Truhart Perfection, description, Ga. 215.
Peppermint wilt control by resistance, 86.
Peridermium strobi, *see* White pine blister rust.
Peridroma margaritosa, *see* Cutworm, variegated.
Periplaneta americana, *see* Cockroach, American.
Perosis—
    in chicks, effect of ethanolamine and betaine, 371.
    prevention in poults, choline requirements, 354.
Peroxidase, estimation, quantitative field test for, 162.
Persimmon *Cephalosporium* wilt, 319.
Pest—
    control, patents relating to, U.S.D.A. 92.
    control poisons, health problems in, 564
    treatments with methyl bromide, new developments in, 91.
Pestalotia disseminata, notes, 335.
Petroleum—
    delivery to farms, Iowa 127.
    fractions of summer-type spray oils, efficiency, relation to composition, 566.
    products for mosquito control, 99.
Petunia pollen, X-ray treatment, cytogenetic consequences, 655.
Phaeoseptoria genus on grasses, new taxonomy and keys, 686.
Phagocytosis, mycorhizal, description of, 186
Phasmidae of Texas, 93.
1,10-Phenanthroline derivatives, color reactions of, 145.
Phenol(s)—
    and rotenone, relative toxicity, effect of change of temperature, 621.
    halogenated, germicidal action, synergistic effect of synthetic wetting agents. 291.
Phenolic compounds, germicidal action, effect of pH and wetting agents, 291.
Phenothiazine—
    effect of varying doses on lambs, 117.
    excretion of, 115.
    fate of in domestic animals, 586.
    for sheep v. other anthelmintics, 483.
    freezing point, 276.
    new treatment for cattle hookworms, Miss. 116.
    newer methods in use, 361.
    repeated dosing of sheep with, effect, 484.
    unconditioned, as anthelmintic in cattle, 483.
Phenoxy compounds, root-inducing activity relation to their structure, 188.
Phlegethontius quinquemaculata, tolerance of larvae to nicotine, 91.
Phleospora graminearum n.sp., description, 227.
Phloeosinus, revision of genus, 95.
Phlox, breaking in color of flowers, due to aster yellows virus, 557.
Phlyctaenia rubigalis, *see* Greenhouse leaf tier.
Phoma—
    spp. on *Hibiscus*, 221.
    terrestris in roots of corn, 324.
Phomopsis—
    sp. notes, 335.
    vexans seed-borne inoculum, extent and effects, U.S.D.A. 319.
Phosphatase, alkaline, and egg formation, 352.
Phosphate(s)—
    admixed rock, stability in cured concentrated superphosphate, 182.
    adsorbed, in soils, relation to crop responses, 521.
    adsorption behavior of inorganic colloids from Indiana soils, 419.
    ammoniated, availability of phosphorus in, 163.
    applied, fixation and availability, effect of soil treatments, 521.
    comparison, S.C. 617.
    defluorinated rock, as bonemeal substitute in laying rations, Wash. 473.
    deposits of world, 181.
    fixation, 180.
    fixation and recovery from lateritic soils, 521.
    fixation in soil and practical control, 181.
    penetration into kaolinite crystal, 181.
    rock in molten state, defluorination, 182.
Phosphoric anhydride in sample containing organic matter, determination, 160.
Phosphorus—
    colorimetric microdetermination, improvements in, 3.
    for crop plants, calcium and potassium metaphosphates as sources, 183.
    in peanut butter, 395.
    metabolism in molds, 647.
    organic, mineralization in soil, 180.
    sources for crops, appraisal, 634.
    supplement for chicks, amorphous calcium metaphosphate as, 581.
Phospho-12-tungstates of certain amino acids, solubilities and compositions, 148.
Photinia (*Heteromeles*) *arbutifolia*, insect enemies of, 92.
Photosynthesis—
    and chlorophyll, 31.
    apparent, in submersed vascular aquatics, effect of depth of immersion, 648.
    effect of mineral salts, relation to amount of assimilates in leaf, 192.
    flash saturation and reaction periods in, 648.
    fundamental aspects, 526.

- Photosynthesis—Continued.
  - molecular equivalence of carbohydrates to CO_2 in, 429.
  - rate, of leaf in relation to its age, 37.
- *Phthirus pubis*, *see* Louse, crab.
- *Phthorimaea operculella* studies, 96.
- *Phycomyces*, specificity of hypoxanthine for, 642.
- Phycomycetes—
  - aquatic, exclusive of Saprolegniaceae and *Pythium*, 292.
  - simple, holocarpic, biflagellate, host index and bibliography, 422.
- *Phyllachora* and related genera, South African species, revised descriptions, 639.
- *Phyllactinia eleagni* n.sp., description, 701.
- *Phyllocoptes destructor*, petunia as important winter host, 468.
- *Phyllophaga*, testaceipennis group, synoptic revision, 344.
- *Phyllosticta*—
  - notes, 335.
  - spp. on *Hibiscus*, 221.
- *Physaloptera* in *Aves*, key to species and parasite host list, 463.
- Physalopterinae of *Aves*, 463.
- *Phytomonas*—
  - *polycolor* notes, 222.
  - *sepedonica*—
    - differential medium for isolation, 327.
    - maintaining in culture for long periods, 221.
    - on potatoes, Colo. 228.
  - spp. cause of sugarcane red stripe disease in Brazil, 692.
  - *stewartii* relation to corn leaf blight, 324.
  - *tumefaciens*—
    - beet root tumors induced by, effect of action of resorcinol and of cyanide on rate of O_2 uptake, 691.
    - relation to plant tumors in sunflower seedlings, 550.
    - tumor formation by, in presence of growth-promoting substances, 76.
- *Phytomyza ilicis*, *see* Holly leaf miner.
- *Phytophaga destructor*, *see* Hessian fly.
- Phytopharmacy in service of agriculture, 685.
- *Phytophthora*—
  - *cactorum* life history, 320.
  - *cactorum* on dogweed and madrona, 235.
  - *capsici* causing blight of peppers, physiology of, 694.
  - *citrophthora*, susceptibility of citrus species to, 699.
  - fruit rot on tomatoes, control, 224.
  - hyphae, composition, 450.
  - infections of citrus, control, 557.
  - *infestans*—*see* Potato blight, late.
  - *parasitica* wilt of rhubarb in New South Wales, 694.
  - rot of belladonna, 702.
- Pickles—
  - and relishes, directions for preparation, N.J. 760.
  - in wartime meals, Mont. 760.
- Piers of Pit River Bridge, welding of 2-in. square reinforcing bars for, 256.
- Pig(s)—*see also* Sows *and* Swine.
  - at different ages, growth, importance of heredity v. environment in, 44.
  - at different ages, growth rates, correlations between, 302.
  - bacon, nutrition, value of potato peelings in, 350.
  - cottonseed meal for, detoxification, Ala. 244.
  - fate of phenothiazine in, 586.
  - fattening—
    - menhaden fishmeal v. cottonseed meal and crab meal for, S.C. 617.
    - on diets containing 20 percent of brewer's yeast, 721.
  - fed large doses of *Salmonella choleraesuis*, response to sulfaguanidine, nicotinic acid, thiamine, and pyridoxine, 350, 591.
  - fed yeast as protein supplement, rachitic symptoms in, 721.
  - feeder, fattening, comparative value of grazing crops, Fla. 721.
  - feeding, protein in, effect of amount and kind, Nev. 471.
  - feeding soybeans to, N.C. 471.
  - feeding studies, Wis. 617.
  - home butchering, economy of, 718.
  - inbred line, development from crossbred foundation, 302.
  - live market, characteristics relation to quality of carcasses produced, 722.
  - livers, vitamin A in, 770.
  - on alfalfa pasture, lignite coal and lignite ash as mineral supplements, N.Dak. 106.
  - on rations extremely low in manganese, 106.
  - orphan, rearing, Mo. 105.
  - poisoning by cacao products, 361.
  - production in New Mexico, N.Mex. 243.
  - protein feeding in wartime to, Okla, 718.
  - purebred v. crossbred, S.C. 617.
  - reactions to hot atmospheres, 242.
  - requirement of nicotinic acid by, 105.
  - sex ratio in, attempts to modify, 50.
  - small and large types, sexual development, 432.
  - wheat-germ products for, nutritional value, 472.
  - young, effects of phenothiazine, 367.
  - young, feeding and management, Mo. 105.
  - young, management for promoting good growth, N.Dak. 348.
  - young, mortality, 117.
- Pigeon(s)—
  - adrenalectomized, body weight and food intake, effect of prolactin and cortical hormones, 306.
  - and ring-necked dove hybrids, genetic sex as determined by sex chromosomes, 434.
  - of genus *Columba*, geographic variation of, 529.
  - pituitaries, lactogenic hormone content, 656.
  - thyroidectomy, technic and early effect on heat production, 48.
- Pigments, animal, 755.

- Pimientos, *see* Pepper(s).
- Pine(s)—*see also* White pine.
  - area townships, analysis of subdivisions in, N.J. 260.
  - beetle mountain—
    - control, penetrating sprays for, 716.
    - important enemy of western pines, U.S.D.A. 95.
  - blister rust, *see* White pine blister rust.
  - Florida, rust of, due to *Cronartium quercuum*, 702.
  - forest, litter fauna of two types, 236.
  - forests of Piedmont Plateau, hardwood invasion in, 680.
  - jack, regeneration following clear cutting on Chippewa National Forest, 72
  - jack, susceptibility to deer browsing, 73.
  - jack, tree classification for, 318.
  - loblolly and shortleaf, growth in east Texas, effect of soil types, 546.
  - loblolly, stocking for second-growth stands, trend toward normality, 72.
  - lodgepole, anatomical studies of roots, 193.
  - lodgepole, growth and development of root systems, 546.
  - longleaf, pruning practices, relation to growth, 72.
  - mice, data on, 461.
  - pinyon, reaction to artificial shade and supplemental watering, 545.
  - ponderosa, natural regeneration, effect of herbaceous vegetation, 546.
  - ponderosa, needles, ecological anatomy, 193.
  - posts, southern, nonpressure preservative treatment, S.C. 617.
  - region of Washington and Oregon, forest resources of, U.S.D.A. 220.
  - sawfly control with concentrated lead arsenate sprays, 576.
  - second-growth red, tree classification for, 318.
  - seed spot protection with screens in California, 317.
  - seedbeds, *Diplodia* blight in, 334.
  - seedlings in prairie soil nursery, role of mycorhizas and phosphorus in growth, Iowa 449.
  - shortleaf, diameter growth, effect of litter removal, 73.
  - shortleaf, planted, and cut-back and uncut hardwood reproduction, relative height growth, 73.
  - soft, *Diplodia pinea* and *Sphaeropsis malorum* on, 702.
  - stomated foliar surface of, estimation, 38.
- Pineapple(s)—
  - dehydration of, 604.
  - fertilizer studies, P.R.U. 218.
  - growth in water cultures, effect of pH and of minor elements, P.R.U. 218.
  - parthenocarpic fruit, effects of growth-regulating substances, 677.
  - potassium and phosphate nutrition, relation to nitrate and carbohydrate reserves, 70.
- Pineapple(s)—Continued.
  - yellow spot, effect of plant populations, 334.
  - Zn deficiency of, relation to soil and plant composition, 30.
- β-Pinene oxidation with selenium dioxide, 278.
- *Pinus*—
  - *echinata*, interrelation of growth, salt absorption, respiration, and mycorhizal development in, 679.
  - *occidentalis* wood, retention of creosote oil in, U.S.D.A. 548.
- *Piptocephalis* parasitizing species of *Penicillium*, *Mucor*, and *Aspergillus*, 76.
- Piroplasmosis, canine, due to *Babesia gibsoni*, chemotherapy, 254.
- *Pissodes nemorensis*, *see* Deodar weevil.
- *Pissodes strobi*, *see* White pine weevil.
- Pistol casebearer in Maryland, Md. 465.
- Pituitary (ies)—
  - anterior—
    - extract, relative sensitivity of five breeds of chicks to, 434.
    - hormones, extraction, separation, and concentration, Mo. 409.
    - of female rats, mitotic activity in, 437.
    - of pig, weight and thyrotropic hormone of, Mo. 436.
  - gonadotropic extracts, augmentation by hemin, 529.
  - growth hormone, bio-assay, 103.
  - lactogenic hormone, studies, 158.
  - of pigeons, lactogenic hormone content, 656.
- *Plagiotrochus suberi* in California, 338.
- Plague—
  - infection among rodents in Western States, relation to plague dissemination, 576.
  - transmission to man from rodents, 236.
- Plant(s)—*see also* Vegetation.
  - absorption of K by, effect of lime and magnesia on, 30.
  - aging in, 296.
  - analysis as diagnostic procedure, 27.
  - and animal resources of Alaska, 704.
  - aquatic, submersed, apparent photosynthesis in, effect of depth of immersion, 648.
  - Brazilian, cuticular transpiration in, methods of study, 643.
  - breeding, expression of hereditary factors in relation to effect of environment, 38.
  - breeding, Spragg memorial lectures on, 652.
  - cancerous neoplasm produced by autonomous, bacteria-free crown-gall tissue in, 550.
  - cation-anion balance in, role of ether soluble organic acids, 427.
  - cells, coacervate formation in, 550.
  - cells, pyridoxin and coacervates in, 34.
  - chromosomes, *see* Chromosome(s).
  - common names and their meanings, 635.

Plant(s)—Continued.
- cuttings, rooting, effect of age of mother plant, 35.
- desert, *see* Desert.
- disease(s)—*see also* Fungi(us) *and different host plants.*
  - and pests in Ecuador, 681.
  - control by chemical means, 685.
  - host-parasite check-list revision, U.S.D.A. 74, 319.
  - in Jamaica, 319.
  - in Kansas, 319.
  - in Southern Rhodesia, list and control, 548.
  - in Trinidad, 221.
  - intensity, measurement in the field, 319.
  - losses in 1942 and control practices, U.S.D.A. 75.
  - new and interesting, 319.
  - Reporter, index to Volume XXVI, U.S.D.A. 449.
  - survey, Canadian, report, 681.
  - virus, insect vectors of, 562.
  - virus, of ornamentals, 223.
  - virus, studies, 562.
- edible wild, N.Dak. 446.
- extracts, analysis for chlorophylls *a* and *b*, 161.
- feeding for profit taking, 633.
- fertilized with phosphates and slags carrying fluorides, fluorine in, 182.
- fiber, *see* Fiber.
- flowering habit and correlation of organs, effect of triiodobenzoic acid, 188.
- fluorine in, from phosphate and slag fertilizers, 522.
- for insecticides and rodenticides, U.S.D.A. 679.
- genetics, papers on, 31.
- geographic distribution in Mexico, 422.
- geography, historical, introduction to, 293.
- growing in laboratory, auto-irrigator for, 427.
- growth—
  - and soil solution concentrations at wilting point, correlation, 415.
  - in sand cultures, effect of salt concentration, kind of salt, and climate, 427.
  - regulation of, 642.
- growth substances—
  - and the rust fungi, 550.
  - determinations in oats seedlings, making shadowgraphs for, 34.
  - in, 31.
  - present status, 525.
  - studies, Wis. 617.
- growth under controlled conditions at California Institute of Technology, 190
- hormones, *see* Plant growth substances.
- house, insects infesting, Mich. 563.
- hydrophytes, xerophytes, and halophytes, alkaloids and sulfur compounds in, comparison, 298.
- in Peru, fungi attacking, 681.

Plant(s)—Continued.
- K absorption by, effect of cationic relations, 28.
- leaves, bordeaux injury at low temperatures, 685.
- material(s)—
  - nicotinic acid in, determination, 164.
  - potassium determination in, 164.
  - preservation, 300.
- measuring availability of water to, use of tensiometers in, 35.
- medicinal and aromatic, of Algeria, 186.
- medicinal, cultivation, 71.
- mineral deficiencies in, diagnosis by visual symptoms, color atlas and guide, 681.
- mineral uptake, effect of ringing and transpiration, 426.
- names, standardized, 523.
- nitrate adsorption by, 297.
- nutrient delivery by sand and silt separates, 172.
- nutrient losses by erosion from Dunmore silt loam, 177.
- nutrients lost through sewage, 633.
- nutrition—
  - and soil development, 172.
  - studies, new technic for, 36.
  - surface relations of roots and colloidal clay in, 172.
- nutritional status, diagnosis, plant-tissue testing in, 27.
- ornamental, diseases and pests, 700.
- ornamental, effects of day length and temperature on growth and flowering, [N.Y.]Cornell 218.
- pathology in Brazil, 449.
- pathology, introduction to, 548.
- pathology textbook, 74
- poisonous—*see also* Livestock poisoning *and specific animals and plants.*
  - and injurious, of Panama, 249.
  - of islands of Pacific, 523.
  - of Maryland, relation to livestock, Md. 482.
  - problem in Southeastern States, 586.
- polarity in, 299.
- protein synthesis in, 646.
- reproductive capacity, 423.
- Research Foundation, Tropical, notes, 408.
- residue fragments of soil, method for measuring, 170.
- respiration, *see* Respiration.
- roots, metabolic activities and bearing on relation of upward movement of salts and water in, 427.
- rubber-bearing, machinery problems in production, 377.
- rubber-producing other than *Hevea*, bibliography and abstracts, Tex. 678.
- sap, organic acids in, determination by liquid extraction method, 164.
- seed, origin and development of primary vascular tissues in, 193.
- stimulative effects of X-rays on, 38.
- succession and land use in Coon Valley, Wisconsin, 524.

Plant(s)—Continued.
  succession on abandoned fields in Wisconsin sand plain area, 186.
  tissue(s)—
    ascorbic acid extraction from, protection during, 15.
    chlorophyll and carotene in, 13.
    culture handbook, 643.
    determination, 164.
    nitrogen determination in, 164.
  transpiration, *see* Transpiration.
  used by man for food and clothing, 635.
  useful, of world, 523.
  vascular, of northeastern Nevada, 524.
  vascular, of University of Illinois woodlands, check list, 292.
  virus infection in, metabolic phenomena associated with, 684.
  viruses, sensitivity to certain inactivators, 550.
  woody, *see* Woody.
Plasma, amino acids in, determination by ninhydrin-carbon dioxide reaction without removal of proteins, 412.
Plasmodiophora brassicae, resistance of crucifers to, relation to mustard oil content, 686.
Plasmodium—
  cathemerium in white Pekin ducks, 3T strain of, 593.
  gallinaceum studies in fowls, spleen volume during, 592.
  lophurae, strain of *Aedes aegypti* selected for susceptibility to, 99.
Plastics—
  phenolic, cottonseed meal in, 154.
  protein-aldehyde, 154.
Plum(s)—
  bacterial canker organism, laboratory tests of bactericides on, 460.
  causal sequence of fruit development, 216.
  diseases in Ozark section of Arkansas, U.S.D.A. 74.
  production in Missouri, Mo.Fruit 544.
  spraying requirements, Miss. 215.
Plusia chalcites parasite in Hawaii, 574.
Plutella maculipennis, *see* Diamondback moth.
Pneumoencephalitis, avian, 486.
Pneumonitis, infant, similarity of cytoplasmic inclusions in, and bovine epithelial cells, 114.
Podosesia syringae in ash, 706.
Pogonomyrmex barbatus molefaciens damage to airplane runways by, 562.
Poinsettia scab, symptoms and status, 234.
Poison ivy description, treatment, and eradication, Utah 309.
Poisonous plants, *see* Livestock poisoning, Plants, poisonous, *and specific plants.*
Poliomyelitis virus persistence in flies, 574.
Pollen—
  deposition, use of bryophytic polsters and mats in study, 423.
  germination and pollen tube growth, effect of pure growth substances, 426.
  pantothenic acid in, 296.
Pollen—Continued.
  X-ray induced changes in, genetic nature, 42.
  X-ray induced mutation rate in, relation to dosage and nuclear cycle, 650.
Polydactyly, a sublethal character in pigeon, 47.
Polyploidy in *Lilium tigrinum*, nature of, 197.
Polyporus palustris, studies, 702.
Polystictus spp. in New South Wales, control, 694.
Ponds—
  farm, fish food from, U.S.D.A. 462.
  management for game and pan fish production, 237.
Popcorn—
  popping expansion, genetic and morphologic characters affecting, 40.
  production in Iowa, Iowa 539.
Popillia japonica, *see* Japanese beetle.
Population(s)—
  group in Madrid, nutritional status, evaluation, 765.
  movements and levels of living in rural areas, 1930–40, Ohio 497.
  natural, isolation by distance, as factor in, 526.
  nutrition of, surveys, 611.
  of Washington, rurban trend in, Wash. 261.
  rural, in New York State, 1940, [N.Y.] Cornell 129.
  trends in New York State, [N.Y.] Cornell 391.
Poria—
  carbonica n.sp. studies, 702.
  microspora n.sp. studies, 702.
  sequoiae, studies, 702.
Pork—
  cured, color developed in, relation to pH, 393.
  home-grown, slaughtering and curing, N.J. 722.
  niacin in, N.Dak. 401.
  production, effect of mange and hog louse, 482.
  quality, effect of locker storage, 606.
  scraps in garbage, Trichinae in, minimum heat treatment for destruction, 118.
Porphyrindin, synthesis, technics in, 16.
Potassium—
  determination, adaptation of indirect method to photoelectric colorimeter, 4.
  fixation in soils of Corn Belt, 29.
  in bacterial fermentation, 636.
  in fruits and fruit products, determination, 165.
  in plant material, determination, 164.
  in soil and absorption by plants, effect of lime and magnesia on, 30.
  in soils of lower Mississippi deltas, availability, 521.
  interrelations in soils and plants, practical applications, 20.
  ion in soils and plants, behavior of, 29.

Potassium—Continued.
- photometric determination, 4.
- polarographic determination, 3.
- purified compounds, preparation, 513.
- relation to citrus nutrition, 699.
- retention from annual additions of chloride, sulfate, and nitrate, as affected by limestone and by dolomite, 420.
- sodium, and chloride, simultaneous determination, in single tissue or blood sample, 166.

Potato(es)—
- aphid survey in Canada, 707.
- aphid survey in New Brunswick, progress of, 91.
- aphids, ecology in North Wales, 689.
- Arran Pilot, blotches on leaves of, 326.
- artificially dried, feeding value, 347.
- Association of America, certification committee report, 227.
- association of heat sprouting with rest period and maturing time in, 208.
- bacterial ring rot, present status, 327.
- beetle damage, prevention, Mo. 463.
- blight, late—
  - control in South, 455.
  - control with metallic Cu, 326.
  - cull piles as source of infection, 326.
  - in Colorado, 326.
  - in New York State and Kentucky during 1942, U.S.D.A. 681.
  - in North Dakota, N.Dak. 455.
  - in Wisconsin on June 7, U.S.D.A. 548.
  - in 1942, U.S.D.A. 548.
  - progress of, U.S.D.A.681.
- blight, southern, due to *Corticium rolfsii*, 456.
- blight-immune varieties, development, 455.
- byproducts, Me. 24.
- cookery, conserving vitamin C in, Mont. 615, 775.
- cossettes, composition and nutritive value, 347.
- cultural and fertilizer studies, Iowa 541
- cultural methods, improved, Soviet government award for, 144.
- culture in Missouri, Mo. 440, 441.
- culture in Rhode Island, R.I. 308.
- diseases—
  - control by spraying and dusting, N.Dak. 455.
  - important soil-borne, effect of crop rotations, 227.
  - in Colorado, prevalence and severity, U.S.D.A. 74.
  - in Hastings section of Florida, U.S.D.A. 681.
  - in Massachusetts, U.S.D.A. 319.
  - studies, Me. 81.
  - virus, papers on, 689.
- dusting experiments in Iowa, 338.
- early, decay in shipments, U.S.D.A. 681.
- experiments at Conservancy Distri Substation, N.Mex. 214.

'otato(es)—Continued.
- fertilizer and nutrition studies, 209, 210.
- fertilizer-rotation studies, Me. 209.
- flakes, slices, and dust, composition and nutritive value, 347.
- flea beetle(s)—
  - control, 468, Wash. 468.
  - development, relation to control in North Platte Valley, 468.
  - revision of circular on, N.Y.State 715.
- Growers' Association, Kaw Valley, Kans. 748.
- in cold storage, sugar content, effect of low concentrations of carbon dioxide on, 648.
- income from, Mich. 599.
- insects, spraying and dusting for control, N.Dak. 463.
- Irish Cobbler, yield, effect of date and depth of planting, 208.
- Kasota, description, 207.
- leaf roll, yield losses caused by, 228.
- leafhopper, host plants, biology, and feeding habits, U.S.D.A. 711.
- leafhopper, pyrethrum substitute for, 337.
- meal, composition and nutritive value, 347.
- mineral deficiency symptoms in, 325.
- moth, effect of acetylene treatment of potato tubers on, 96.
- moth in stored potatoes, inert mineral dusts for control, 96.
- nematodes on, in New York, U.S.D.A. 681.
- new, dehydration problem in, 763.
- new phosphatic materials used on, 62.
- Pawnee, description, U.S.D.A. 62.
- Pawnee, new variety for Colorado growing conditions, Colo. 307.
- peeling by new lye method, 283.
- plant, flower-bud formation, 208
- plants sprayed with zinc arsenite, increases in aphid populations on, 340.
- pollen produced in field and in greenhouse, comparison, 207.
- possibilities in north Alabama, 207.
- powdery scab, susceptibility of varieties to, 689.
- production—
  - and marketing in Rhode Island, R.I. 599.
  - experiments, Okla. 539.
  - in Alabama, value of organic matter and irrigation for, 62.
  - in Oklahoma, Okla. 540.
  - in Scotland, modern aspects, 688.
  - on Long Island, effect of phosphorus sources, 210.
- psyllid control, dusting for, Wyo. 464.
- purple-top wilt caused by aster yellows virus, 689.
- quality, factors affecting, 210.
- rate of development of sugar in, during cold storage, effect of post-harvest prestorage conditions, 647.
- refuse piles as factor in dissemination of late blight, Me. 326.

Potato(es)—Continued.
- ring rot, location and movement of causal agent, Colo. 228.
- root eelworm, resistance of potato varieties to, 690.
- scab *Actinomyces* demonstrated by fluorescence microscopy, 689.
- scab resistance on Michigan college muck, seedling and variety test, 81.
- seed, age of maximum reproduction vigor in Irish Cobbler variety, 208.
- seed, improvement and large volume production program, 81.
- seed stock, disease-free, to be produced at station, Utah 51.
- seed stocks, good, for increased yields N.Y.State and Cornell 307.
- seed stocks in North Wales, factors affecting health of, 689.
- seed, treatment, testing and adjusting corrosive sublimate solutions, 688.
- seeds and seedlings treated with colchicine, periclinal chimeras induced by, 800.
- seed-source tests, relation to field plat design, 206.
- seed-testing program of Alabama, value. 207.
- Sequoya, resistant to hopperburn, 338.
- situation in 1943, relation to production, late blight infection, and weather in 1942, U S.D.A. 548.
- species, diploid, self-incompatibility in, 196.
- spindling sprout, physiological nature, 689.
- spotted wilt, transmission through tubers 455.
- starch grains, structure and staining, 286
- stem-end discolorations due to *Fusarium oxysporum* f. *tuberosi*, 81.
- studies, Wis. 617.
- tuber growth, auxanometer for continuous recording, 190.
- tuber tissue, water absorption by, effect of auxin, 188.
- tuber worm—
    - control, 96.
    - in Nebraska, 338.
    - potato and tobacco as hosts, comparative suitability, 706.
    - studies, 562.
- tubers, effect of zinc oxide on cut surfaces of, 456.
- tubers, inducing early germination for greenhouse virus tests, 690.
- varietal differences and inheritance of vitamin C and A in, 652.
- varieties—
    - newer, produced with less labor and expense, 207.
    - performance in Louisiana, La. 207.
    - performance in South Carolina, 207
- varieties, relative response to changing temperatures and photoperiods, 206.
- varieties, seed pieces cut from apical and stem ends, stands and yields from, 208.

Potato(es)—Continued.
- virus leaf roll resistance in, 81.
- witches'-broom transmission by dodder and cure by heat, 551.
- yellow dwarf virus and clover leafhopper, relation, 327.
- yellow-dwarf virus, transmission by clover leafhopper, genetic variation in, 690.
- yield, effect of fertilizers, 62.
- yield, effect of number of plants per hill, 209.

Poultry—*see also* Chick(s), Chicken(s), Duck(s), Fowl(s), Hens, *etc.*
- amylase in gall bladder bile of, 723.
- and egg marketing in South Dakota, S.Dak. 125.
- and eggs in cookery, 610.
- artificial insemination in, value, 202.
- bibliography, Kans. 350.
- blood, erythrocyte counts in, effect of sex hormones, 203.
- breeds and varieties, number of feathers on, 106.
- crosses, two- and three-way, between different breeds, 45.
- diseases, bibliography, 119.
- diseases, treatise, 369.
- enterprise on upland farms near Douglas Reservoir, Tenn. 738.
- farming, commercial, 722.
- feed hoppers, construction and use, Miss. 734.
- feed situation, wartime, suggestions for meeting, 244.
- feeding problems, wartime, meeting, Ohio 779.
- feeding studies, Wis. 617.
- feeds, fermentation byproduct in, value, Md. 472.
- feeds, wartime, Okla. 352.
- fertility in male, effect of feed restriction, 202.
- gastric pH and acidity in, effect of dietary factors, 583.
- house(s)—
    - and equipment, Calif. 379.
    - blackout of, U.S.D.A. 259.
    - floors, new hard surfaced, S.Dak. 492.
    - lighting uneconomical for hens over one year old, Utah 108.
- increasing wartime production, Ohio 352.
- inheritance of characters and linkage relations, 528.
- keeping, backyard, 579.
- lice control with sodium fluosilicate, 562.
- lice control with sulfur, 710.
- management, 579.
- nutrition, shark liver oil as source of vitamins A and D in, Fla. 580.
- nutritive requirements, Mo. 469.
- parasites, internal and external, Mo. 730.
- plasma, complement-fixation test as applied to, 586.
- poisoning by cacao products, 861.
- premature ovulation in, following progesterone administration, 528.

Poultry—Continued.
  premature ovulation of maturing follicles induced by hormones, 48.
  preservation by freezing, N.J. 604.
  production in South, 722.
  production, increasing for war program, N.Dak. 107.
  protein feeding in wartime to, Okla. 718.
  rations, conservation of animal protein in, 579.
  rations for, Mo. 103.
  rations for growth, Ohio 107.
  reactions to hot atmospheres, 242.
  research, recent developments in, N.C. 486.
  Rhode Island Reds, egg production and fertility in, 199.
  spleen, reputed reservoir function of, 350.
  starting mashes, use of pure riboflavin in, 108.
  testicular activity, effect of comb and wattle removal, 304.
  utilization of fat by, 244.
  war effort, veterinarian's responsibility in, 724.
  wheat feeding, relation to blue comb, 486
  White Leghorn, body weights in different strains, 200.
  White Leghorn, selection for viability and egg production in, 200.
  White Plymouth Rock, strains for specific economic purposes, 303.
Poverty grass lands, reclaiming, trash mulch method with alfalfa, Ohio 659.
Powder post borer, timber treatment with boric acid for protection against, 571.
Power and agriculture labor situation in North Carolina, N.C. 596.
Prairie—
  chicken, data on, 462.
  resurvey of grasses, forbs, and underground plant parts at end of great drought, 423.
  studies in Kansas, 293.
  vegetation in Canada, effects of climate and grazing practices, 536.
  weeds, illustrated guide to, 666.
Precipitation—*see also* Rainfall, Snow, *etc.*
  for 1941, N.Mex. 413.
  variation in United States, 166.
Pregnancy—
  diagnosis in the mare by hormonal means, 203.
  in hypophysectomized rats, hormonal requirements for, 203.
Pressure cooker, directions for use and timetable for vegetables, 761.
Prices—
  and price indexes, tables of, Okla. 382.
  paid by farmers, use in administering wartime price control programs, 381.
  received by farmers in type-of-farming areas of State, La. 747.
  wartime, and agriculture, Md. 390.
Pricklypear, *see* Cactus.
Proctacanthus—
  philadelphicus attacking bees in New England, 576.
  rufus attacking bees in New England, 576.
Prodenia eridania, *see* Armyworm, southern.
Production goals for 1943, State and National, Miss. 122.
Prolactin assay, nonspecific results obtained with micromethod for, 203.
Proline, phospho-12-tungstates of, solubilities and compositions, 148.
Promachus—
  bastardii attacking bees in New England, 576.
  fitchii attacking bees in New England, 576.
Propamidine, new wound antiseptic, 249.
Propionibacteria, vitamin B requirements, 638.
Protein(s)—
  and amino acids, chemistry of, 755.
  and amino acids, metabolism of, 755.
  cellular, dissociation by incipient drought, relation to physiological processes, 191.
  crystalline—
    from lipoprotein of wheat flour, 19.
    from unbleached wheat flour, bactericidal and fungicidal properties, 16.
    from wheat flour, effect on small laboratory animals, 16.
    wheat, studies, 19.
  electrophoresis and chemistry of cell surfaces, 15.
  feeding in wartime, Okla. 718.
  feeds, digestibility by foxes, 472.
  in dairy rations during present emergency, Vt. 723.
  iodinated, thyroidal activity, effect of progressive iodination followed by incubation, 529.
  metabolism, symposium, 136.
  of cellular nuclei, nature of, 147.
  supplements, gross value, determination, with cockerel and pullets, 245.
  X-rays and stoichiometry, of, 147.
Protein-chlorophyll complex, 191.
Proteinase, brain, studies, 148.
Proteus vulgaris, vitamin synthesis by, 769.
Protoplasmic streaming, monographic review, 36.
Protostrongylus rushi of mountain sheep, 366.
Prune dehydration experiments, 763.
Pseudococcus—
  comstocki, *see* Mealybug, Comstock.
  kenyae biological control, 711.
Pseudomonas—
  aeruginosa, role as plant pathogen, 222.
  definition of generic name for certain bacterial plant pathogens, 319.
  mors-prunorum, laboratory tests of bactericides on, 460.
  spp. in water supply of butter manufacturing plants, Iowa 585.

Pseudopregnancy, copper-induced, effect of pretreatment with oestrogen, 531.

Pseudopyridoxine and fungi, 641.

Psila rosae, *see* Carrot rust fly.

Psorophora columbiae, transmission of equine infectious anemia of subclinical form by, 118.

Psorosis in citrus nursery, identification, 232.

Psyllid situation in 1940, 464.

Pterocladia sp., agar yield from, 33.

Ptinus—
- *latro*, new pest in Utah, 562.
- *tectus* biology and behavior, 241.
- *tectus* damaging furs in Alaska, 562.

Public works and rural land use, 383.

Puccinia spp. on safflower, 702.

Puccinia stakmanii n.sp., description, on cotton, 324.

Pullet(s)—
- laying, methods of feeding grain to, Fla. 582.
- or blue comb disease, etiology, pathology, and prevention, N.H. 369.
- pasture for, as means of feed conservation, Mich. 583.
- protein requirements, N.J. 723.

Pulp and paper mill waste, bacterial flora of, 636.

Purdue University notes, 270, 407, 618.

Purple scale in Florida, effect of fungicidal sprays on, 712.

Pyelonephritis, bovine, pathology, 727.

Pyrausta nubilalis, *see* Corn borer, European.

Pyrethrum—
- analysis, modified method, 567.
- culture in Dalmatia and applications to Americas, 567.
- flowers constituents, 17.
- insecticides, synergistic action of sesamin with, 92.
- oil emulsions, types as mosquito larvicide, 98.
- sprays, dosage-mortality curve studies with houseflies, 708.
- substitute for control of potato leafhopper, 337.

Pyridoxine—*see also* Vitamin B_6.
- conjugated, in rice bran concentrates, 140.
- deficiency—
  - effect on basal metabolism and respiratory quotient in rats, 504.
  - effect on N metabolism, 399.
  - in swine, relation to anemia, epileptiform convulsions, and fatty liver, 591.
- effect on lactic acid bacteria, 185.
- effective in protecting pigs from *Salmonella choleraesuis*, 591.
- in plant cells, 34.

Pyrophosphate, determination by precipitation with cadmium, 411.

Pythium—
- *graminicolum* oospores, fungus parasite of, 76.
- *mamillatum* in Britain, 330.
- root rot of *Aloe variegata*, control, 557.

Pythium—Continued.
- spp. causing damping-off of belladonna, 702.
- spp. in Southern States, 222.
- taxonomy, host range, and geographic distribution, 683.
- *ultimum*, cause of damping-off in cotton seedlings, 454.

Q fever epidemiology, 113.

Quackgrass—
- exposed rhizomes, seasonal variations in drought resistance, 66.
- shoot apex, nucleoli in, 526.

Quail—
- bobwhite, germinated v. ungerminated seed in diet of, 462.
- bobwhite, management area, development, 559.
- chicks, *Salmonella bredeney* from, 372.
- food habits, 336.
- valley, in California, food habits and coccidian infection in, 592.

Quarantine-entomology in California, development in, 91.

Quebracho as source of tannin, U.S.D.A. 219.

Quercus, new names in, 34.

Questionnaire, mailed, differences between persons responding and not responding to, 753.

Quince seed extract as ice cream stabilizer, 585.

Quinine from fresh cinchona seed, U.S.D.A. 544.

Rabbit(s)—
- Arizona and antelope jack, forage consumption and preferences, Ariz. 335.
- as used in disease research, bibliography, 369.
- atropinesterase, a genetically determined enzyme in, 198.
- coloring, phenogenetics of, 528.
- cottontail, gonadotropic activity of pituitary gland in relation to seasonal sexual cycle, 47.
- cottontail, management in southwestern Michigan, 89.
- fate of phenothiazine in, 586.
- for meat, raising and marketing, Mo. 472.
- male, inactivation of oestrone in, 656.
- meat, preparing for the table, 760.
- ova, fertilized tubal, effects of *l*-tyrosine, *l*-phenylalanine, and *l*-arginine on, 531.
- production, feeding, and care, Ind. 584.
- production for meat and skins, 559.
- publications on, 704.
- raising for food and fur, 722.
- raising for home use, N.J. 722.
- reactions to hot atmospheres, 242.
- recipes, 760.
- semen treated with lactic acid and sodium bicarbonate, fertility and sex ratios in, 50.
- sex ratio in, attempts to modify, 50.
- thyrotropic hormone, effect of pregnancy and lactation, 47.
- tick, host and seasonal notes, 101.
- use of sulfaguanidine in, effect, 485.

- Rabies—
  - in sheep, 116.
  - paralytic, and equine encephalomyelitis viruses, immunological relations, 481.
  - vaccine, sheep brains and cords for preparation, comparative value, 580.
- Raccoons—
  - habits and management in Michigan, 559
  - in Illinois River bottom lands, fur yield and autumn foods, 89.
- Radiant energy nomenclature, 649.
- Radiation, *see* Solar radiation.
- Rain infiltration in soil, effect of mulches of soybean residues, corn stover, and wheat straw, 488.
- Rainfall—*see also* Precipitation, Snow, *etc.*
  - and runoff compilation from watersheds—
    - in Missouri, 628.
    - of the Pacific Northwest conservation experiment station, U.S.D.A. 289.
  - in New England, northern part, 289.
  - tabulated data, Ga.Coastal Plain 517.
- *Rainieria brunneipes*, unusual rearing, 99.
- Rake, buck—
  - home-made, description, Mont. 490.
  - performance in hauling hay and grain bundles, Ohio 733.
- Rams, progeny performance, measuring in small flock, 301.
- Range(s)—
  - conservation for maintaining high production, Utah 102.
  - conservation practices, important to improve forage on Pacific Northwest grazing areas, U.S.D.A. 306.
  - equipment, wartime, Ohio 121.
  - grasses, *see* Grass(es).
  - grazing capacity, determination, U.S.D.A. 243.
  - lands of North Dakota, relation to drought and grazing, N.Dak. 438.
  - management, 101.
  - plants, poisonous, *see* Plants, poisonous, Livestock poisoning, *and specific plants.*
  - plants, summer, composition, Utah 410.
  - western, utilization standards for progress in, 423.
- Raspberry(ies)—
  - anthracnose, 88.
  - breeding, production of tetraploids in, 654.
  - canes, freezing, desiccation, and winter injury, histological study, 70.
  - frozen, quality tests of varieties, Utah 501.
  - infection by silver-leaf fungus in New Zealand, 697.
  - Latham, three-year-old fruiting canes in, 674.
  - leaf curl outbreaks in Scotland, 697.
  - North Dakota-grown, freezing preservation, N.Dak. 501.
  - red- and purple-fruited, identification by primocanes, 674.
- Rat(s)—*see also* Rodents.
  - and mice, latest developments in control, 336.
  - fed evaporated v. filled milk, comparison, 266.
  - fed succinylsulfathiazole, growth-promoting effect of folic acid and biotin in, 505.
  - fed white flour, hyperplasia in forestomach epithelium of, prevention, 757.
  - hypophysectomized immature male, response to pregnant mare serum, 656.
  - hypophysectomized, width of proximal epiphysial cartilage of tibia in, 103.
  - inbred strains, transplantation and individuality differentials in, 45.
  - liver arginase activity, effect of hypophysectomy and of purified pituitary hormones, 201.
  - metabolism and growth rate, 399.
  - reproductive system of male, effects of antigonadotropic serum on early postnatal development, 304.
  - strains, difference in response to augmentative gonadotropic effect, 45.
  - typhus-infected, eradication for control of murine typhus, 588.
  - tyrosine poisoning in, 725.
  - wild, as vectors of swine ascarids, 360.
- Ration, emergency, preparation for use in liberated countries, 765.
- Rationing, bibliography of, U.S.D.A 261.
- Recreational livelihood area, 735.
- Red mite, citrus, and its predators, sampling technic for determining populations, U.S.D.A. 242.
- Red scale—
  - California—
    - and parasite, mass production of, 570.
    - citrus, attempts at mass infection with bacteria, 94.
    - effectiveness of cube and derris resins in tank-mix oil against, 712.
    - effectiveness of cube resins in spray oils against, 465.
    - exudation associated with feeding location of, 561.
    - nicotine and cube in oil sprays for control, 570.
    - susceptibility to fumigation, effect of moisture and field dust, 712.
    - susceptibility to HCN, effect of inbreeding, 561.
  - new species related to, 94.
- Red spider—
  - new, on citrus in southern California, 468.
  - on house plants, Mich. 563.
- Red squill, vegetative propagation, 190.
- Reforestation in northern Wisconsin, ecological factors in, 547.
- Relapsing fever—
  - and Ornithodoros turicata as spirochetal reservoir, 587.
  - in the Americas, symposium, 482.

Rennet curd firmness, measurement and variations, 111.
Rennin, purification from commercial rennin extract, and properties, 17.
Reptiles—
  and amphibians of North America, check list, 706.
  poisonous, of world, wartime handbook, 336.
Respiration—
  in *Azotobacter*, apparatus for studying, 33.
  of mosaic-infected tobacco plants, 83.
  plant, and tyrosinase, 37.
  plant, energy changes associated with, 37.
  rate, of leaf in relation to its age, 37.
Revenue, public, in Ohio, Ohio 127.
Rhagoletis cingulata, *see* Cherry fruitfly.
Rhagoletis pomonella, *see* Apple maggot.
Rhizobium—
  bacteriophage, isolation and identification, 176.
  cultures, testing, method and appartus 525.
  leguminosarum, bacteriophage of, medium adapted to, 424.
Rhizoctonia—
  bataticola, association with retting flax in South Australia, 227.
  infection of potato, effect of crop rotations, 227.
  microsclerotia causing leaf blight of fig, 698.
  solani causing cotton root rot in Punjab, 324.
  solani virulence, effect of various soil fungi on, 76.
  spp. causing leaf blight of fig, 608.
Rhizopus spp. cause of sweetpotato soft rot, N.J. 457.
Rhododendron dieback and canker, U.S.D.A 681.
Rhodometer, new dark-adaptation instrument, description, R.I. 770.
Rhubarb wilt or crown rot in New South Wales, 604.
Ribbonbush, powdery mildew on, 557.
Riboflavin—
  and gallstone formation in cholesterol-fed guinea pigs, 503.
  and thiamine interrelations in metabolism, 504.
  deficiency—
    effect on basal metabolism and respiratory quotient in rats, 504.
    effect on N metabolism, 399.
    in man, experimental, 614.
  in foods in terms of common measures, U.S.D.A. 138.
  in liver, factors affecting, 401.
  in pecans, Ariz. 503.
  in plant materials, 296.
  in soil, relation to organic matters in, 641.
  in tomato plants, 641.
Riboflavin—Continued.
  microbiological determination, preparation of samples for, 514.
  pure, in poultry starting mashes, 108.
  synthesis by lactose-fermenting yeasts, 641.
  urinary excretion, effect of protein intake of dogs and rats, 139.
Riboflavin-boron complex, water-soluble, 14.
Rice—
  bran concentrates, conjugated pyridoxine in, 140.
  effect of irrigation treatments, 664.
  fertilization, Ark. 441.
  varieties, effect of photoperiod, 298.
Ricinoleic and ricinelaidic acids, geometric configurations of, 276.
Rickets in yearling sheep, etiology and definition, 254.
Rickettsiae, pathogenic, nomenclature, 587.
Ring compounds, synthesis, 275.
Ringworm—
  disease in muskrat, 369.
  of cattle, N Dak. 510.
Road use, county, and finance in Maryland, Md. 383.
Rocky Mountain spotted fever—
  duration of potency of tick-tissue vaccine, 113
  lone star tick as vector, 252.
  rickettsia, recovery from lone star tick 588.
Rodenticides, plants for, U S D A 679.
Rodents, Montana, human diseases contracted from, 236.
Roentgen rays, *see* X-rays.
Root—
  crops, boron content, 428.
  crops, polyploid, production and value, 42.
  distribution, effects of pasture practices, 53.
  knot control by summer plowing, U.S.D.A. 681.
  knot nematode—
    cause of celery yield reduction, U.S.D.A. 681.
    on lima beans in Maryland, U.S.D.A. 681.
  knot, unusual occurrence in central Iowa, U.S.D.A. 75.
  rot, oomycetes associated with, antagonism and parasitism among, 77.
Rope care and use on the farm, U.S.D.A. 378.
Rose(s)—
  black spot on canes, 234.
  black spot, war situation, 234.
  Crimson Glory, ancestry of, 219.
  greenhouse, effect of spray on photosynthetic rate, 234.
  thornless, breeding, 219.
  understocks, nematode resistance in, 234.
  winter injury, cause, 219.
  Zitkala, new variety, 219.

- Rosin and modified rosins, ester gums from, 156.
- *Rostrella coffeae*, coffee disease due to, 700.
- Rotation of crops, irrigated, Mont. 657.
- Rotenone—
  - and phenol, relative toxicity, effect of change of temperature, 621.
  - decomposition in sprays, effects of oxygen and sunlight, 567.
  - determination, improved method, 15.
  - dispersion, 93.
  - hydrogenation products, detection and estimation of dehydrorotenone in, 567
- Rothamsted, history and development, 510.
- Roundworms in swine, control, S C. 617.
- Rubber—
  - dandelion in Wisconsin, Wis. 617.
  - plantation, outlook for in tropical America, 448.
  - producing plants—
    - machinery problems in production, 377.
    - other than *Hevea*, bibliography and abstracts, Tex. 678.
  - synthetic, survey of literature, Iowa 622
- Rubbertrees, Pará and castilla, climate of principal regions of cultivation, 288.
- *Rubus* genus in North America, 34.
- Rumen digestion, peculiarities of, 717.
- *Rumex* spp. of Illinois, taxonomic study, 292.
- Runoff—
  - and production of protective cover, effect of pasture practices on, 536.
  - and rainfall compilation from watersheds in Missouri, 628.
  - erosion, and methods of control, N.H. 372.
  - forecasting from snow surveys, 25.
  - from pasture land and relation to composition and sheep production, effect of soil treatment and grazing management, 536.
- Rural—
  - and farm level of living index for counties, development in 1940, 753.
  - area of Connecticut, ethnic group relations in, Conn.Storrs 751.
  - community(ies)—
    - emerging, S.Dak. 391.
    - Harmony, Georgia, culture of, U.S.D.A. 261.
    - Irwin, Iowa, culture of, U.S.D.A. 498.
    - life, impact of war on, 749.
  - credit, *see* Agricultural credit.
  - labor, *see* Agricultural labor *and* Labor.
  - land use and public works, 383.
  - taxation in Ohio, Ohio 127.
- Rurban—
  - population of Washington, analysis, Wash. 261.
  - zone, land, people, and farming in, R.I. 752.
- Rust fungi—
  - and plant growth substances, 550.
  - from northwest Himalaya, 639.
  - of Venezuela, additions to, 639.
  - two new species from India, 557.
- Rust mite, buckeye, alternation of generations in, 101.
- Rust(s)—
  - of Guatemala, check list and host index, U.S.D.A. 450.
  - resistance, cellular changes in relation to, 450.
  - studies, Australian, 323.
  - tropical, descriptions, 186.
- Rutabagas, production, U.S.D.A. 68.
- *Ryania*, wood structure, 431.
- Rye—
  - as cover crop, effect on leachings from Dunmore silt loam, Va. 520.
  - varieties and seeding studies, N.J. 51.
  - varieties for Montana, 439.
  - winter, adaptation for supplementary pasture, 53.
- Ryegrass, varieties and seeding studies, N.J. 51.
- *Saccharomyces cerevisiae*—
  - grown from single cell, resistance to low temperatures, 642.
  - growth, unknown factor in, 187.
- *Sacciolepis glabra* n.sp. description, 202.
- Safflower—
  - rusts, 702.
  - rusts and other diseases, U.S.D.A. 548.
- *Sagaritis provancheri*, important parasite of tobacco budworm, 562.
- *Saintpaulia ionantha* powdery mildew, U.S.D.A. 74.
- *Saissetia oleae, see* Black scale.
- *Salmonella*—
  - *bredeney* from quail chicks, 372.
  - *enteritidis dublin* from bovine feces and milk, isolation, media for, 588.
  - *florida* and *madelia*, new types with similar somatic antigens, 251.
  - genus, group E, micro-organisms of, Ky. 250.
  - problem status, 588.
  - *pullorum* and other micro-organisms from turkeys positive to pullorum test, cross-agglutination studies, 371.
  - *pullorum* infections of breeding turkeys, 371.
  - spp., in apple juice, longevity, 607.
  - spp., nutritional requirements, comparison, 112.
  - suggestion for discarding as generic name, 320.
  - types, occurrence and distribution in United States, 360.
  - *typhimurium* in mice, basis for genetic resistance to, 528.
  - *typhimurium* infections of breeding turkeys, 371.
- Salt concentration, fertilizer experiment, S.C. 617.
- Salt index of fertilizers, use of term, 179.
- Saltbush as feed for sheep, 719.
- Sand—
  - culture beds, large, surmounted by individual air-conditioned greenhouses, installation, 643.
  - dune, Michigan, sand transport by wind over, 629.

Sand—Continued.
  dune stabilization on Cape Cod, 632.
  fly control in salt marshes, diking for 715.
  quartz, soil colloid and organic colloid, swelling of, 173.
Sandal spike disease, *Jassus indicus* as vector, 703.
Sandy soils, drainage water losses from, effect of cropping and cover crops, Conn. [New Haven] 177.
Sanninoidea—
  exitiosa, see Peachtree borer.
  pictipes, see Peach borer, lesser.
Saponite, chemical and physical properties, Mo. 409.
Sarcocystis tenella, life history, Wyo. 358.
Sarcosporidia, life history, Wyo. 358.
Sauerkraut, home-made, N.Y.State 760.
Sausages, soybean flour in, determination, 8.
Sawfly(ies)—
  attacking pines in eastern Canada, 576
  parasites. European species, laboratory propagation, 91.
  small, operating in wartime, U.S D.A 73.
Scabies—*see also* Mange *and* Sheep scab.
  on soldiers, tests of mixtures against, 94.
Scale insects—*see also* Black scale, Purple scale, *and* Red scale.
  on citrus, problems in control, 238.
  on peach trees, N.C. 465.
Schinopsis spp., important sources of commercial tannin, U.S.D.A. 219.
Schistosomes, avian, life cycles, method of investigation, 112.
Schizophyllum commune in New South Wales, control, 694.
School lunch programs, handbook for workers in, U.S.D.A. 766.
Schools, elementary, problem of declining enrollment in, S. Dak., 391.
Scilla bulb rot due to *Penicillium hirsutum,* 319.
Scirpus, genus, key to North American species, 186.
Scirtothrips citri, *see* Citrus thrips.
Sclerotinia—
  caricis-ampullaceae remarkable subarctic species, 686.
  laxa, cause of apricot blossom blight, control, 696.
  laxa in apricots and almonds, eradicant spray tests for, 333.
  sclerotiorum blight of sunflowers, 692.
Scolytus—
  multistriatus, see Elm bark beetle, smaller European.
  sulcatus in western New York, 338.
Screwworm(s)—
  menace to livestock, Mo. 482.
  young, toxicity of heterocyclic compounds to, 706.
Seasons, commencement and average duration, 628.
Seaweeds—
  agar-bearing, at La Jolla, California, 33.
  South African, agar from, 636.
Seed(s)—
  farm, testing at home, S Dak. 66.
  germination and seedling growth studies, 426.
  inspection, Ind. 308, Mass. 444, Me. 213, N.J. 66.
  protectants, new, N.J. 84, U.S.D.A. 319.
  protectants, newer, experimental results with, 693.
  stocks, nursery, propagating results, 215.
  stored, viability, effect of temperature and humidity, Hawaii 443.
  testing value, and suggestions for sending to laboratory for tests, Mont. 444.
  treatments for vegetables, summary, 451.
  treatments for victory garden, U.S.D.A. 319.
Seedlings, treating with colchicine, technic, 34.
Selection, efficiency of methods, 44.
Selenious acid and selenites, determination, 161.
Selenium toxicology, recent aspects of, 586.
Sensitive fern poisoning in horses, N.H. 368.
Septoria—
  alopecuri, and related species, status, 551.
  leaf spot of chrysanthemums, 233.
  oudemansii on Kentucky bluegrass, 532.
Sequoia sempervirens, shoot apex, vascular differentiation in, 193.
Sequoias, shoot apices of, comparison, 193.
Serine, colorimetric determination, 162.
Sesame in insecticides, 568.
Sesamin—
  compounds related to, structures and synergistic action with pyrethrum insecticides, 92.
  synergistic action with pyrethrum insecticides, 92.
Settlers, prospective, in Alaska, information for, Alaska 597.
Sewage—
  plant nutrients lost through, 633.
  sedimentation of, 732.
  solids, digestion, production of phosphine during, 158.
  wastes, acid, treatment with lime, 158.
Sex control problem, acid-alkali, review, 50.
Sex hormones, *see* Hormones.
Shark liver oil as source of vitamins A and D in poultry nutrition, Fla. 580.
Sheep—*see also* Ewes *and* Lambs.
  bighorn, in Wyoming under Federal aid to wildlife restoration program, 236.
  blowfly, *see* Blowfly, sheep.
  brains and cords, comparative value for vaccine preparation, 589.
  breeds, description and illustration, 349.
  Corriedale, scoring, Wyoming system, Wyo. 243.
  fate of phenothiazine in, 586.
  fate of sulfanilamide in, 484.
  feeding experiments with spineless cactus and saltbush, 719.

Sheep—Continued.
- fertility in, effect of nutrition during breeding season and pregnancy, Calif. 579.
- inbreeding experiments, Minn. 198.
- Karakul, producers of Persian lambskins, 721.
- livers, vitamin A in, 770.
- louse studies, 562.
- nematodes, preparasitic stages, overwinter survival on pasture, 306.
- nutrition, bibliography, 349.
- of different breeds and types, wool and lamb production from, N.Mex. 719.
- old-type Navajo, characteristics and production, 432.
- on summer ranges, activities and grazing habits, 349.
- osteodystrophic diseases in New Zealand, 254.
- parasite problem in Augusta Co., Va. 365.
- parasites, control for increased war production, N.C. 483.
- parasitism in, control with phenothiazine in salt lick, 117.
- parrot mouth in, inheritance, 44.
- poisoning—*see also* Livestock poisoning. Plants, poisonous, *and specific plants*
  - by *Halogeton glomeratus*, 364.
- protein feeding in wartime to, Okla. 718.
- Rambouillet—
  - clean wool yield variation from different parts of fleece, 720.
  - fiber density and methods of measurement in fleeces, 720.
- ranches, profits of, effect of increased prices and rates of production, Utah 617.
- range, forage consumption, method of determining, 578.
- range, inheritance of fleece weights in, 198.
- reactions to hot atmospheres, 242.
- Rocky Mountain bighorn, life history, 236.
- rumen contents, fate of carbohydrates in, 349.
- rumen, fluctuation of pH and organic acids in, 349.
- scab and wool production, Mo. 482.
- skin folds in, Utah 432.
- stomach worms, active immunization against, 117.
- ticks, eradication by one dipping, 590.
- ticks, large scale control, new recommendations for, 344.
- treatise, 349.
- urinary calculi in, 364.
- worm parasites of, treatments for control, [N.Y.]Cornell 484.

Shrew, tularemia in, 588.

Shrubs—
- and trees of Rhode Island, check list, 640.
- of Champaign Co., Illinois, 292.
- ornamental, chlorosis-resistant, Utah 71.
- southwestern, desert, revision of status, 292.

Silage—
- grass, cost of production, Mass. 598.
- making, losses in, Ohio 102.
- molasses-alfalfa and phosphoric acid-alfalfa, comparison for dairy cattle, N.J. 354.
- sorghum, effect of urea treatment, Miss. 471.
- soybean-millet molasses for dairy cows, Md. 354.
- studies, Wis. 617.
- sumac sorghum for fattening steers, Tex. 243.

Silica—
- gels preparation, simplified method for, 287.
- photometric determination in presence of phosphates, 7.

Silicon, purified compounds, preparation, 513.

Silver compounds and mixtures as fungicidal sprays, [N.Y.]Cornell 321.

Simuliidae of western United States, taxonomic and distributional study, 576.

Simulium—
- *beameri* n.sp., description, 576.
- *stonei* n.sp., description, 576.

Sires—*see also* Bulls.
- proved in dairy herd improvement associations, U.S.D.A. 723.

Skim milk—
- casein in, refractometric determination, 7.
- dried, browning, effect of moisture, 157.
- dried, manufacture, effect of neutralization of sour milk in, 157.
- v. whole milk for calves, Del. 474.

Skunks, control, 704.

Slides, convenient washing devices for, 287.

Slip covers for furniture, U.S.D.A. 616.

Smuts—*see also specific hosts.*
- new Canadian, 77.
- on wild grasses, germination of, 451.

Snapdragon rust resistance, breeding for, Mass. 448.

Snow surveys—
- forecasting runoff from, 25.
- Nevada cooperative, 289.
- Utah cooperative, Utah 289.

Snowberry seed germination, effect of addition of nitrogen on, 191.

Soap industry, demand for fats and oils in, Iowa 495.

Social—
- economics of North Dakota, 752.
- participation of farm families, [N.Y.]Cornell 392.

Society of American Bacteriologists, branch meetings, papers, 142.

Sociometric scale, restandardization of, 601.

Soda, caustic, disinfection activity, 725.

Sodium—
- polarographic determination, 3.
- potassium, and chloride, simultaneous determination, in single tissue or blood sample, 166.
- purified compounds, preparation, 513.

Soil(s)—
- aggregates, water-stable, factors affecting, 179.
- aggregation, improved by microbial activity, effect on runoff and erosion, 176
- aggregation, relation to rate of application of organic matter, 175.
- amendment and disinfectant, new, promising, 224.
- and field-crop management, Catskill-Mohawk area of New York, [N.Y.]Cornell, 290.
- and water conservation, farm planning for, economic aspects, 745.
- bacteria, flagella staining technic for, 285.
- bacteriophage in, semiquantitative determinations, 424.
- buckshot, management, Miss. 418.
- colloids, *see* Colloid(s).
- conservation—
  - and pastures of Puerto Rico, U.S.D.A. 536.
  - and soybean production, Mo. 519.
  - costs and returns, Wis. 290.
  - in wartime, 255.
  - measures and increased wartime production, 488.
- development and plant nutrition, 172.
- development field study, advantages and problems of, 169.
- erosion—
  - and runoff, methods of control, N.H. 372.
  - by wind and water-stable and dry clod structure of soils, relation, 416.
  - by wind, measurement by dry sieving procedure, 176.
  - control, 519.
  - control measures for increasing production in Northeastern States, U.S.D.A. 417.
  - effect of slope on, Mo. 417.
  - effect of surface stones on, 632.
- fertility—
  - and cropping systems, Mo. 418.
  - biological assays, 175.
  - control for greenhouses, Mich. 418.
  - effect of leguminous plant additions, S.C. 617.
  - leaf analysis as guide to, 298.
  - level, effect on fertilizer results, Miss. 419.
  - practices for maximum yields of cotton and corn, Miss. 439.
- fertilized, available nutrients in, at various seasons, 180.
- fine-textured, in eastern Nebraska, studies, 179.
- forest, compared with cultivated, structural stability and permeability, 171.
- formation, distribution and engineering characteristics, 518.
- formation, effect of environment, 169.
- formation from acid and basic igneous rocks, 518.

Soil(s)—Continued.
- forming processes, 168.
- from great soil groups, microscopic study, 518.
- fumigation with methyl bromide for control of animal parasites, 360.
- genesis from fragmental volcanic rocks in Lesser Antilles, 169.
- groups of China, chemical characteristics, 414.
- groups on Mt. Graham, Arizona, vertical zonation of, Ariz. 413.
- in a virgin hemlock-beech forest on Allegheny Plateau, 25.
- in flats, method for sterilization and subirrigation, 453.
- leachings from Dunmore silt loam, effects of different cover crops, Va. 520.
- loessial, variations in silt and clay fractions of, 171.
- magnesium retention in, relation to form and rates of additions, 183.
- major agricultural, of north-central Wisconsin, differences in, 519.
- management on Delta buckshot soils, Miss. 418.
- management studies, Wis. 617.
- manual for Seventh Farm Credit District, U.S.D.A. 25.
- mechanics, theoretical, 517.
- moisture—
  - control under growing plants, limitations of auto-irrigators for, 27.
  - effect of surface stones on, 632.
  - electrical methods of determining, 171.
  - equilibrium points, relation to clay and organic matter, 415.
  - movement and evaporation, relation to pF, 177.
  - thermodynamics of, Calif. 631.
- nature and properties, 517.
- of California and their extracted clays, freezing points, 173.
- of Corn Belt, K fixation in, 29.
- of Florida, algal flora, 290.
- of lower Mississippi deltas, availability of potassium in, 521.
- of Oklahoma, identification, mineral criteria as aid in, 170.
- orchard and garden, under different cultural treatments, aggregation of, Ohio 519.
- peat, *see* Peat.
- penetrometer, description, 170.
- permeability of, 175.
- populations, subsurface, activity, 416.
- properties of soil organic matter and of sesquioxides associated with aggregation in, 28.
- puddled, formation of water-stable structure in, 415.
- reaction, effect of carbon dioxide on, 174.
- science, fundamentals of, 517.
- semidesert grassland, effect of surface mulches on water conservation and forage production in, 416.

Soil(s)—Continued.
  shrinkage, method of measuring, 170.
  solodized, of Red River Valley, 414.
  solonchak, exchangeable bases of, 518.
  solution concentration, effect of fertilizers, 179.
  solution concentrations at wilting point, correlation with plant growth, 415.
  structure, changes in, measurements for following, 172.
  structure, pore-size distribution as measure, 171.
  survey in—
    Georgia, Dade County, U.S.D.A. 289
    Idaho, Blackfoot-Aberdeen area. U.S.D.A. 632.
    Indiana, Knox Co., U.S.D.A. 518.
    Montana, Wheatland Co. Mont. 290
    North Carolina, Henderson Co. U.S.D.A. 632.
    Ohio, Lucas Co., U.S.D.A. 632.
    Rhode Island, Providence Co., U.S.D.A. 518.
    South Carolina, Pickens Co., U.S.D.A. 518.
    South Carolina, Sumter Co., U.S.D.A. 170.
    Texas, Dimmit Co., U.S.D.A. 518.
  suspension, importance of agitation with glass electrode, 172.
  temperature, effect of surface stones on, 632.
  temperature, studies, importance and effect on crops, 167.
  testing, modern methods, 421.
  tube for obtaining wet clay cores in undisturbed condition, 170.
  type, base unsaturation and pH in relation to, 175.
  types, horizons of, activity of microflora in, 176.
  ureaselike activities in, origin, 26.
  use for war production, 740.
  water, *see* Soil moisture.
  water-stable and dry clod structure, relation to wind erosion, 416.
  whole, and soil aggregates, distribution of total and alkali-soluble organic matter between, 183.
  with diverse types of carbonate horizons, chemical characteristics, 519.
Solar radiation data, 289.
Solenopsis geminata, *see* Fire ant.
Solidago spp. of Illinois, key to, 292.
Solonchak of Red River Valley, exchangeable bases of, 518.
Solutions, liquid-in-liquid, determination of concentration in, 286.
Solvents, volatile, pressure wash bottle for, 2.
Sorghum—
  diseases, chemical seed treatments for control, U.S.D.A. 553.
  hybrid, Tift Sudan, Ga.Coastal Plain, 442.
  kernel smuts, effect on development of host, 82.
  leaf spot in Louisiana, cause, 690.
Sorghum—Continued.
  seed rot and seedling blight, U.S.D.A. 456.
  silage, *see* Silage.
  top rot, 552.
  varieties, improved, registration. 62.
  waxy, for manufacture of special starches, outlook, Nebr. 441.
  weak neck in, 211.
  zonate leaf spot, a new disease of, 82.
Sorgo—
  sirup and sugar production, 515.
  varieties and seeding studies, N.J. 51.
  variety tests, N.Mex. 534.
Sorosporium syntherismae, genetics of, 451.
South Carolina Station notes, 272.
South Carolina Station report, 616.
South Dakota College notes, 512.
South Dakota Station notes, 512.
South Dakota Station report, 406.
Sow thistle, perennial, and its smooth variety in Canada, 66.
Sows—*see also* Pig(s) *and* Swine.
  efficient production of, Mo. 471.
Soybean(s)—
  and products, chemistry and technology, U.S.D.A. 283.
  and soil conservation, Mo. 519.
  as food, symposium, 760.
  Biloxi, leaf blades, effect of temperature on photoperiodic reactions, 649.
  boron content, 428.
  dehydrated, methods of drying, storage, and cooking, R.I. 397.
  differential growth response to varied mineral nutrients, Mo. 540.
  diseases, control, U.S.D.A. 457.
  disases in Minnesota, U.S.D.A. 319.
  edible, variety tests, use and culture, Okla. 441.
  feeding to pigs, N.C. 471.
  flour in sausages and other meat products, determination, 8.
  flour, nutritional value, 132.
  flour, use in ice cream mix, 112.
  growth response to vitamins, 296.
  hay, late-cut v. early-cut, for stocker cattle, Ky. 243.
  in diet of man, 756.
  in occidental diet, potential role, 756.
  iron utilization in, inheritance and physiology of efficiency in, 632.
  meal chick rations, phosphorus requirement with, 351.
  meal for baby chicks, 244.
  meal, heat denaturation of protein in, 153.
  merits as emergency hay crop, N.Y.State and Cornell 307.
  oil, digestive coefficients, 759.
  oil mill crushing capacity and estimated crush, U.S.D.A. 749.
  oil, phosphatides from, 154.
  phosphatides as deposit-builders in nicotine bentonite and lead arsenate spray mixtures, 342.

- Soybean(s)—Continued.
  - production, Va. 308.
  - production, reducing labor and power in, 489.
  - protein, adhesive strength and color, 154.
  - response to strains of nodule bacteria, 295.
  - seed, equilibrium moisture content, effect of variety and environment, 664.
  - significance in dietary of Filipinos, 756.
  - streak in Ohio, U.S.D.A. 74.
  - uses in home and in industry, P.R.U. 154.
  - varieties and seeding studies, N.J. 51.
  - varieties grown for grain, Miss. 51, 204.
  - varieties, rates of seeding, Miss. 439.
  - variety tests, N.Mex. 534.
  - yield and cash value per acre at different sections, Minn. 534.
- Species—
  - origin of and systematics from viewpoint of zoologist, 89.
  - relations, immunogenetic studies, 435.
- *Spelaeorhynchus latus*, parasitization of, P.R.U. 346.
- Spergon—
  - disease control with, U.S.D.A. 319
  - tests, 686.
  - value for small grain seed treatment, 225.
- Spermatogenesis in hypophysectomized rats, effect of pregneninolone and pregnenolone, 531.
- Spermatozoa—
  - bull—
    - effect of Amphyl on motility and longevity of, 49.
    - methods of estimating number, 48.
    - respiration rate of, Mo. 437.
    - stored, livability, factors affecting, [N.Y.]Cornell 49.
    - survival, effect of diluters, rate of cooling, and storage temperatures, 49.
  - concentration in fowl and bull semen, determination 531.
  - ejaculated, metabolism, effect of pH and electrolytes, 530.
  - glycolysis, inhibition of, and reversibility of effects of metabolic inhibitors, 530.
  - respiration, inhibition of, and reversibility of effects of metabolic inhibitors, 530.
  - stored, survival in genital tract of mare, 304.
- Spermodochidium, an unusual type of spermatial fruit-body in ascomycetes, 523.
- *Sphaceloma*—
  - *ampelinum*, Gouirand and Bergeron's treatment of, 556.
  - *batatas* notes, 692.
  - *murrayae* n.sp. causing gray scab of willow, 335.
  - *poinsettiae* n.sp., description, 234.
  - scab disease of poinsettia, 234.
- *Sphacelotheca panici-miliacei*, genetics of, 451.
- *Sphaerella linorum* notes, 553.
- *Sphaeropsis malorum* on soft pines, 702.
- *Sphaerotheca humuli fuliginea* on delphiniums in California, 701.
- *Sphecius speciosus*, life history and habits, 100.
- Spice oils and components for controlling microbial surface growth, 761.
- Spider lily seeds, photosynthetic activity in, 429.
- Spider mite, *see* Red spider.
- Spider webs, reservoirs of dermestid beetles, 715.
- Spinach—
  - dehydrated and powdered in several ways, quality, 603.
  - dehydrated, methods of drying, storage, and cooking, R.I. 396.
  - diseases and injuries in Arkansas, U.S.D.A. 74.
  - Nobel, photoperiodic response, inhibiting effect of leaves, 446.
  - riboflavin in, 296.
  - seed, new treatments for, N.Y.State and Cornell 331.
  - seed treatments for, 75.
  - troubles in Arkansas, U.S.D.A. 74.
  - varieties, Mich. 445.
- Spinasterol β- and δ-, isolation from alfalfa seed oil, 277.
- Spinning mite, new, attacking sugarcane, P.R U. 346.
- *Spirochaeta obermeieri*, survival in fasting and nonfasting ticks, 482.
- Spray(s)—*see also* Fungicide(s), Insecticides, *and specific forms.*
  - boom, portable, for experimental plats, 706.
  - copper, *see* Copper.
  - dosage-mortality curve, studies, 708.
  - equipment, new, evaluation, 237.
  - insecticidal, biological assay, 92.
  - nozzle discs, relative abrasion by fungicidal dust ingredients, Ohio 733.
  - oil, *see* Oil sprays.
  - residue, problems relating to, 563.
  - residue situation in Illinois, 563.
- Spraying solutions in liquefied gases, production, 568.
- Spruce—
  - and alpine fir type areas in Colorado and Wyoming, 220.
  - coneworm and spruce foliage worm, differentiation, 573.
  - sawfly, European, in Quebec, population studies, 577.
  - sawfly, European, studies, 100, 242.
- Spurge family chromosome number and phylogenetic relations, 653.
- Squash borer studies, N.Y.State 713.
- Squash bug, formation of tracheal funnel in, 94.
- Squirrel(s)—
  - Beechey ground, population study in central California, 559.
  - new trichostrongylid nematode from stomach of, 236.
  - thirteen-striped, directions for poisoning, 704.
  - tree, control, 704.

Stablefly, spraying cows for, effect on milk production, 108.
Staining—
  methods, 290.
  rack for handling cover-glass preparations, 287.
Stallion enrollment, Ind. 472.
Staphylinidae, monograph, 95.
Staphylococci, antitoxin of, in blood, milk, and colostrum of cows, 727.
Staphylococcus—
  albus, isolation from hemolymph of oriental cockroach, 93.
  aureus resistance to penicillin, 249.
  mastitis in a goat, fatalities due to milk from, 590.
Starch(es)—
  air-dry wheat, hysteresis, 22.
  from waxy corn and other cereals as replacement for tapioca, 152.
  grains of potato tuber structure and staining, 286.
  granules, oxidation by electrolysis in alkaline sodium chloride solution, 152.
  moisture determination in, and its modifications, 9.
  pastes, viscosity measurements, interpretation of, 9.
  propionate, preparation and properties, 152.
  V type X-ray diffraction patterns of, significance, 274.
  viscosity of, 152.
Steers—*see also* Cattle, beef.
  fattening on milo grain, U.S.D.A. 348.
  fattening, shelled corn and hominy feed for, comparison, Mich. 578.
  fattening, silage and cottonseed meal for, Tex. 243.
  stocker, sorghum silage v. rye pasture for wintering, S.C. 617.
Stereum purpureum on raspberry in New Zealand, 697.
Steroids, studies, 755.
Sterols—
  of alfalfa seed oil, 277.
  papers on, 277.
Stilboestrol, mono- and di-alkyl ethers of, 277.
Stinkbug, Say, on potatoes in Montana, 562.
Stock, *see* Livestock.
Stock foods, *see* Feeding stuffs.
Stomach worm(s)—
  in sheep on semiarid range of New Mexico, death losses from, 365.
  in sheep, phenothiazine for control, Okla. 484.
  in the calf, experiments on skin test for immunity to, 115.
  larvae from sheep pasture, overwinter loss of, 365.
Stomatitis, vesicular, virus, infection of chick embryo with, factors affecting, 593.
Stomoxys calcitrans, *see* Stablefly.
Storm frequency distribution in United States in double Hale solar cycles, remarkable reversal in, 167.
Stoves, combination coal-electricity and coal-bottled gas, oven performance, 508.
Straw itch mite in insect culture, control, 100.
Strawberry(ies)—
  and products, ascorbic acid in, Mont. 505.
  borax on, N.H. 315.
  breeding and inheritance of characteristics, 675.
  Burgundy, origin, development, and characteristics, 217.
  culture, N.J. 445.
  culture in Idaho, Idaho 70.
  culture in Michigan, Mich. 217.
  frozen, quality tests of varieties, Utah 501.
  fruit damage by *Blapstinus* spp., 337.
  fruit, developmental analysis, 447.
  insects, control, Mo. 463.
  leafroller, American, control, 91.
  plants, cold resistance in early stages of growth, 675.
  plants, winter storage of, N.H. 315.
  red stele in New York, U.S.D.A. 681.
  red stele resistance, breeding for, 232.
  response to boron, 675.
  weevil control, 91.
Stream flow—
  into drains, model tests of, 177.
  measurements, of United States, 487.
  records of Pennsylvania, 413.
Streams, small, controlling sand movement in, S.C. 617.
Streptococci, lactic acid fermentation under aerobic conditions, 475.
Streptococcus—
  agalactiae agglutinins in bovine blood serum and whey, 116.
  spp. in cow's udder, effect of germicidal substances, Utah 482.
  spp. in milk, Hotis test for detection, U.S.D.A. 588.
Streptothricin activity against *Brucella abortus*, 359.
Strychnos spp. of Rio de Janeiro, currare-like action of, 298.
Stumpage and log prices for 1941, U.S.D.A. 221.
Sucrose, phosphorolysis and synthesis with a bacterial preparation, 185.
Sudan grass—
  adaptation for supplementary pasture, 53.
  diploid and tetraploid, rate of root elongation in, 195.
  leaf spots, inheritance of, 41.
  merits as emergency hay crop, N.Y.State and Cornell 307.
  varieties and seeding studies, N.J. 51.
Sugar(s)—*see also* Lactose, Sucrose, *etc.*
  and similar products, possibilities of production in Hawaii, 515.
  content of grass, relation to soil fertility and growth, 52.
  identification by microscopic appearance of crystalline osazones, 8.

- Sugar(s)—Continued.
  - manufacture, relation to aconitic acid and derivatives, 515.
  - substitutes in diet, Miss. 500.
- Sugar beet(s)—
  - black root of seedlings, 690.
  - black root, relation to fertilizers, 691.
  - blocking by machinery, U.S.D.A. 376.
  - boron deficiency in, 84.
  - curly top-resistant varieties, Utah 51.
  - fertilization, Wis. 617.
  - grown for seed, S and N deficiency relations, 62.
  - growth, effects of soil structure, 62.
  - leafhopper, *see* Beet leafhopper.
  - loader, description and plans, Mich. 594.
  - mechanical thinning, Colo. 376.
  - mechanization, labor saving by, 375.
  - nematode in southwestern Ontario, problems concerning, 707.
  - nematode, pattern of distribution in Lambton Co., Ontario, 707.
  - production, muck soil management for, Mich. 211.
  - returns from, effect of production costs, 124.
  - seed industry, domestic, growth of, 211.
  - seed production in southern Utah, U.S.D.A. 540.
  - seed yields, effect of fertilizers, N.Mex. 534.
  - variety tests, N.Mex. 534.
  - yellows virus, effect in the field, 327.
- Sugarcane—
  - borer—
    - control program for Louisiana, La. 572.
    - in Florida, biological control, 97.
    - in Puerto Rico, control by laboratory-reared parasites, 714.
    - in Tucuman, 466.
    - second-generation, control by airplane dusting with synthetic cryolite, 466.
  - farms, family-sized, costs and returns, La. 738.
  - farms, large, costs and returns of operating, La. 124.
  - germination, effect of depth of planting, 541.
  - juice, bacteria causing slime in, 691.
  - mosaic-diseased plants, disappearance of virus from, 553.
  - new spinning mite attacking, P.R.U. 346.
  - N fertilization, search for guidance in, 63.
  - N in, 63.
  - plant synthesis of sucrose in, 525.
  - red stripe disease in Brazil, 692.
  - smut, varietal tests for, 553.
  - varietal yields, statistical analysis, 211.
  - variety CP 29–116 superior for sirup production, Miss. 657.
- *Suhria vittata*, extraction of agar from, 636.
- Sulfaguanidine—
  - effect of prolonged administration to rabbits, 485.
- Sulfaguanidine—Continued.
  - effective in protecting pigs from *Salmonella choleraesuis*, 591.
  - treatment of coccidial infections of lambs, 484.
- Sulfanilamide—
  - in animals, dosage and tolerance, 249.
  - ointment in veterinary surgery, 115.
- Sulfapyridine effect on cows known to eliminate *Brucella abortus* in milk, 726.
- Sulfate ion determination, method, 4.
- Sulfonamide film for use as surgical dressing, 249.
- Sulfonic acids, aromatic identifying, arylamine salts as derivatives for, 160.
- Sulfur—
  - compounds, chemistry and metabolism, 755.
  - damage probed, effects on citrus, 609.
  - direct determination, 161.
  - elemental, as fungicide, Va. 322.
  - in forages, N.Dak. 410.
  - in organic materials, improved semimicrodetermination, 4.
  - metabolism of children, 137.
  - mixtures, *see* Lime-sulfur.
- Sunflower—
  - characters, associated with seed yield and oil content, 664.
  - disease in experimental field at Buenos Aires, 692.
  - diseases, 692.
  - seed and plant characters, effect of cultural practices, 664.
- Sunspot data, 289.
- *Supella supellectilium*, *see* Cockroach, brown-banded.
- Superphosphate—
  - composition and properties, 182.
  - manufacture, volatilization of fluorine in, 182.
- Sweet corn—*see also* Corn.
  - bacterial wilt in Pennsylvania, U.S.D.A. 681.
  - bacterial wilt, relation to coldness of preceding winters, 693.
  - fertilizers for, N.H. 310.
  - infestation by European corn borer, significance of growth stages of, Conn. [New Haven] 572.
  - leaves, injury from *Dikraneura carneola*, 337.
  - origin, 40.
  - Purdue 39 mutant, breeding behavior, 526.
  - pure and hybrid strains, electrical correlates, 653.
  - response to seed treatments, effect of weather, 75.
  - top rot, 552.
  - yellow, hybrids, descriptive and historical study, N.Y.State 666.
- Sweetclover—
  - disease, hemorrhagic, studies, 114.
  - effects of self-pollination in, 41.
  - fungi affecting, U.S.D.A. 686.

- Sweetclover—Continued.
  - Golden Annual, cross-fertility relations, 63.
  - root rotting and premature death of unexplained origin, 553.
  - stem nematode on, 323.
  - varieties for Montana, Mont. 439.
  - winter survival in fall sown plats, 659.
- Sweetpotatoes—
  - a highly productive feed crop, P.R.U. 243.
  - carotene in, factors affecting, 212.
  - cracking, borax for, N.C. 439.
  - curing and storing with electricity, 214.
  - experiments at Conservancy District Substation, N.Mex. 214.
  - fertilizer experiments, S.C. 617.
  - *Fusarium* wilt, pathogenicity studies, 320.
  - injury from organic mercury dips, reduction of, 692.
  - meal, dehydrated, in chick rations, La. 107.
  - meal for fattening hogs in dry lot, S.C. 617.
  - new disinfectants for, U.S D A. 319.
  - Porto Rico, sprout production of strains, S.C. 617.
  - production, time-of-planting and hill-spacing studies, Miss. 495.
  - scab, stem and foliage, history and distribution, 692.
  - scurf control with Thiosan, 327.
  - seed and sprout treatment, S.C. 617.
  - seed, chemicals effective for treatment, Va.Truck 82.
  - seed, new treatment for, Miss. 82.
  - shredding, prior to drying for livestock feed, equipment for, Ala. 783.
  - soft rot control, N.J. 457.
  - sprouts, new rootdip treatment for control of wilt, 229.
  - time of planting and hill spacing studies, Miss. 442.
  - vine cuttings recommended to increase war-needed acreage, Miss. 657.
  - vines harvested for livestock feed, N C. 491.
  - weevil control, methyl bromide fumigation for, and effect on yield, 345.
  - weevil host preference, 706.
- Swine—*see also* Pig(s) *and* Sows.
  - control of worms in, Ga.Coastal Plain, 485.
  - erysipelas in turkeys, 372.
  - erysipelas serum, preserving, Nebr. 728.
  - hoofs, powdered, in poultry rations, 582.
  - hoofs, powdered, nutritive value, 582.
  - inbreeding experiments, Minn. 198.
  - influenza—
    - associated with hog cholera, 366.
    - British, strains, antigenic relations to standard human and swine influenza viruses, 366.
    - summary, 366.
    - virus and *Hemophilus influenzae suis* synergistic action on chick embryo, 590.
- Swine—Continued.
  - kidney worms, worms, and roundworms of, control, S.C. 617.
  - practice, problems in, 724.
- Sylvatic plague studies, 361.
- Symptomatic anthrax, *see* Blackleg.
- *Synthesiomyia nudiseta,* life history, 468.
- Tachinidae—
  - new, from northeastern United States, 574.
  - new North American, 99.
- *Taeniothrips simplex, see* Gladiolus thrips.
- Tannin from dividivi, U.S.D.A. 679.
- Tapioca, replacement by starch from waxy corn and other cereals, 152.
- *Taraxacum officinale,* anatomy, 300.
- Tarnished plant bugs, abundance, effect of legumes, 569.
- Taxation, county, and government, Tex. 128.
- Taxes, farm—
  - and tax valuations in Ohio, 747.
  - efficient use by Tennessee counties, Tenn. 128.
- Tea substitutes, 31.
- Teeth—
  - decay of, and paradentosis in Antipodes, 756.
  - distribution of caries and related considerations, 756.
  - of children in Hawaii, decay relation to diet, 756
  - of the people of New Zealand, 756.
- Temperature—*see also* Climate(s) *and* Soil temperature.
  - in Hawaii, lags and ranges of, 167.
  - lowest March, of record at State College, Miss. 413.
  - tabulated data, Ga.Coastal Plain 517.
- Tennessee—
  - counties, consolidation, areal and functional, Tenn. 383.
  - Station notes, 272, 408.
  - Station report, 269
  - University notes, 272.
- *Tenodera*—
  - *angustipennis,* oothecae of, studies, 340.
  - *sinensis, see* Mantis, Chinese.
- *Terminalia arjuna,* leaf spot on, 335.
- Termite(s)—
  - in citrus groves, 93.
  - shields, laboratory tests of, 708.
  - tap root damage to cotton from, 708.
- Terracing procedure, unified, 488.
- Testosterone propionate in liver during vitamin B complex deficiency, inactivation, 48.
- Tetrachloro-*p*-benzoquinone as substitute for scarce metallic fungicides, 322.
- *Tetranychus*—
  - *lewisi* n.sp., on citrus, description, 468.
  - *pacificus, see* Pacific mite.
  - spp., *see* Red spider.
  - *telarius,* toxicity of N-heterocyclic compounds to, relation to chemical constitution, 566.

- Tetraploidy production in raspberries by colchicine treatments, 654.
- Textiles—*see also* Fabrics.
  - textbook, 615.
- *Thamnotettix argentata*, vector of tobacco yellow dwarf, life cycle, 94.
- *Theobroma cacao*, causes of damage to cacao fruit, 460.
- Thiamine—*see also* Vitamin B_1.
  - and riboflavin interrelations in metabolism, 504.
  - biosynthesis by normally athiaminogenic micro-organisms, 185.
  - deficiencies in American and Asiatic diets, 756.
  - deficiency, detection, reliable procedure for, 267.
  - deficiency, effect on N metabolism, 399.
  - effective in protecting pigs from *Salmonella choleraesuis*, 591.
  - estimation by fermentation method, calculated blank for, 12.
  - feeding effect on milk and fat production, 355.
  - in crown gall measured with *Phycomyces* assay, 682.
  - in extracts of wheat meal and bread, 624.
  - in foods, in terms of common measures. U.S.D.A. 138.
  - in fresh and frozen vegetables, 400.
  - in milk preparations, relation to vitamin B_1 requirement of infants, 772.
  - in peanut butter, 395.
  - in pecans, Ariz. 503.
  - relation of fungi to, 424.
  - requirement of man, 267.
  - requirement of rat, effect of substitution of protein for carbohydrate in diet, 400.
- *Thiobacillus thiooxidans* on sulfur, respiration of, 637.
- Thiuram sulfides, behavior in spore germination tests, 550.
- Thrips—
  - association with powdery mildews, 222.
  - on house plants, Mich. 563.
  - red-banded, on cacao, effect of light, 94.
  - *tabaci*, *see* Onion thrips.
  - western, calcium cyanide fumigation for, 708.
- Thunderstorms, location and frequency, determination by radio method, 288.
- Thyroid—
  - activity of iodinated proteins, effect of progressive iodination followed by incubation, 529.
  - function in cattle, experimental alteration, 361.
  - of fetal rat, beginning of function in, 47.
- Thyroproteins, highly active, formation in vitro, biologic assay and uses, Mo. 435.
- Tick(s)—
  - bacteria associated extracellularly with, catalog, 90.
  - cattle, control, 562.
- Tick(s)—Continued.
  - causing relapsing fever, transovarial transmission of spirochetes through five generations of, 587.
  - fever due to *Babesia gibsoni*, 254.
  - lone star, spontaneous infection by rickettsia of Rocky Mountain spotted fever in, 588.
  - lone star, vector of Rocky Mountain spotted fever, 252.
  - new Mexican, *Ixodes mexicanus* and *I. tancitarius*, 346.
  - parasite in Great Britain, 577.
  - protecting man and livestock from, Mo. 569.
  - rare genus on bats in Puerto Rico, P.R.U. 346.
  - unusual site of attachment for, 346.
  - vectors and life cycles of ticks, 482.
- Tiller, subsurface, converted from tractor plow, 375.
- *Tilletia* spp. of Argentina, revision, 683.
- Timber—*see also* Wood(s).
  - crops, farm, marketing, Mo. 497.
  - farm, availability for Michigan's wood-using industry, Mich. 547.
  - farm, marketing in Michigan, Mich. 547.
  - marketing, Ind. 221.
  - native Michigan, use in box and crate industry, Mich. 318.
  - of New World, textbook, 679.
  - treatment with boric acid for protection from powder post borer, 571.
- Timothy as silage and hay, conservation of nutrients, Vt. 468.
- Tissue(s)—
  - convenient washing devices for, 287.
  - impressions for laboratory study, preparation, 704.
- *Titaeospora andropogonis*, cause of sorghum leaf spot, 690.
- Titanium, volumetric determination of, 5.
- Toad as enemy of blister beetles, 706.
- Tobacco—
  - adaptation of crop insurance to, 381.
  - availability of nutrients for, tissue tests v. soil tests, Va. 521.
  - black shank in Virginia, U.S.D.A. 681.
  - black shank-resistant varieties and strains, 329.
  - bright, downy mildew of, in Virginia, U.S.D.A. 548.
  - budworm, important parasite of, 562.
  - Burley, enterprise on upland farms, Tenn. 124.
  - Burley, oubreak of *Plantago* virus in, 83.
  - carriers, survey for stored-tobacco insects, 563.
  - cigar-leaf, yield and composition, effect of fertilizer and preceding crop, Pa. 665.
  - curing and fermentation, 190.
  - curly top, severity, effect of site of inoculation, 457.
  - damping-off, tests with disinfectants for, 692.

Tobacco—Continued.
- diseases—
  - in Massachusetts, U.S.D.A. 319.
  - in 1942, 692, Conn.[New Haven] 457.
  - in Puerto Rico, U.S.D.A. 74.
  - seedbed sprays for, Wis. 617.
  - studies, Ky. 229, S.C. 617.
- downy mildew control, emulsified oils for, U.S.D.A. 229.
- downy mildew in South Carolina, U.S.D.A. 548.
- experiments at Windsor Substation, Conn.[New Haven] 442.
- flue-cured, farms, adjustments for greater profits, Fla. 738.
- flue-cured, new varieties, N.C. 63.
- frogeye and greenspot, relation between 229.
- fumigation at reduced pressures, 566.
- *Fusarium* wilt, pathogenicity studies, 320.
- Institute of Puerto Rico, report, 64.
- leaf spot due to *Cercospora nicotianae*, varietal resistance, 327.
- low-grade, new uses for, Ky. 284.
- low-nicotine, studies, 212.
- moisture in, determination methods, 164.
- mosaic disease resistance in a hybrid tomato, 554.
- mosaic infected plants, respiration in, 83.
- mosaic virus—
  - concentration and purification by Sharples super-centrifuge, 279.
  - derivatives of, 328.
  - distinctive strain, properties, 83.
  - genotypes resistant to, 230.
  - resistant varieties, reaction to certain strains of viruses, 458.
  - ribgrass strain, sulfur distribution in, 329.
  - strains, basic amino acids in, 229, 280.
- necrosis, viruses causing, description of preparations, 230.
- plants, mosaic-infected, respiration of, 83.
- production, costs and returns, in Jefferson Co., Ind. 124.
- *Pseudo aeruginosa* affecting, 222.
- riboflavin in, 296.
- root-rot resistant variety, new, Yellow Special, Va. 308.
- seed, certified, Wis. 212.
- seedlings, cryolite injury to, 561.
- shade-grown, control of eastern field wireworm on, 716.
- splitworm, S.C. 617.
- statistics, reports on, U.S.D.A. 390, 601
- streak, symptoms in various plants, 554
- Turkish, passage of viruses from scion to stock, effect of contact period, 692.
- variety and curing studies, S.C. 617.
- worm, tolerance of larvae to nicotine, 91
- yellow dwarf vector, life cycle, 94.

Tomato(es)—
- anthracnose control, 224, Ohio 86.
- ascorbic acid in, Utah 507.
- ascorbic acid in, effects of vaporous naphthoxyacetic acid, 67.
- bacterial wilt in Texas, U.S.D.A. 548.
- cannery, methods of delivering, 741.
- culture for home use, Mo. 446.
- culture in Michigan, Mich. 68.
- diseases, U.S.D.A. 555.
- diseases of Puerto Rico, control, P.R.U. 230.
- dominance in quantitative character, inheritance in, 652.
- enterprises on upland farms, Tenn. 124.
- experiments in Ozarks, Mo. 542.
- fertilizer experiments, S.C. 542.
- filter press cake as fertilizer for, P.R.U. 214, 309.
- for canning, greater production of, Md. 446.
- fruit rot due to potato late blight fungus, 224.
- fruitworm, S.C. 617.
- fruitworm injury, relation to cropping practices, 562.
- fungicidal dusts or sprays for, S.C. 617.
- green, vitamin C loss from, 775.
- greenhouse production, growth-promoting chemicals for, value, Ohio 67.
- growth and vitamin content, effect of micronutrient deficiencies, 668.
- hybrid, derivatives, tendency to escape tobacco-mosaic disease in, 554.
- juice from tomato paste, 607.
- juice, home-canned, ascorbic acid in, availability for human nutrition, 404.
- leaf blight, prevention, 223.
- leaflets infected with *Alternaria solani*, technic to compare virulence of isolates of, 555.
- mite, petunia as important winter host, 468.
- new parasite of, 87.
- paste as source of tomato juice, 607.
- Pennheart, new early variety, Pa. 312.
- plant(s)—
  - comparative injury by fungicidal spray and dust mixtures, Ohio 668.
  - composition, effect of nutrients, as compared to composition of fruit, 667.
  - defoliation as response to gaseous emanations from the fruit, 231.
  - molybdenum injury, 555.
  - riboflavin and pantothenic acid in, 641.
  - starter solutions for, N.Y. State 446.
- production, Kans. 312, Mo. 542.
- products, home preparation, N.Y.State 760.
- psyllid, *Metaphycus* n.sp. parasitic on, 464.
- quality, effect of soil fertility, 215.

Tomato(es)—Continued.
  riboflavin in, 296.
  roots, excised—
    cultivation, nutrient deficiency and improved inorganic nutrient, 297.
    growth in agar with thiamine plus pyridoxine, nicotinamide, or glycine, 187.
    nutrition, effect of glycine, pyridoxine, and nicotinic acid in, 187.
    nutrition, role of sucrose in, 296.
  roots, isolated, nutrition experiments, 426.
  roots, source and phosphatase activity of exoenzyme systems, 189.
  seed treatments for control of *Alternaria solani*, 694.
  seeds, disinfecting, P.R.U. 230.
  Spartan Hybrid, for greenhouse production, 667.
  spraying, economical use of copper in, 223.
  stem growth, effect of root system, 35.
  stem rot on outdoor plants, 331.
  stems, red ring of, due to mirid bug 459.
  varietal yield tests, 215.
  varieties—
    and species, ascorbic acid in, 140.
    at Conservancy District Substation, N.Mex. 214.
    new determinate type, relation to prairie horticulture, 67.
    timing spray schedules for, Ohio 331.
  variety tests, S.C. 543.
  virus disease, new to Maryland, 231.
  wilt *Fusarium*, increase of pathogenicity in, 86.
  yield and leaf blight, effect of different fungicides, 223.
Township suitability as a unit for sampling Iowa agriculture, Iowa 595.
Toxoplasmosis in wild rats, 361.
Toyon, insect enemies of, 92.
Tractor(s)—
  costs in eastern Washington and future food production, Wash. 494.
  costs in western Washington and food production, Wash. 493.
  effect on farm labor and work stock organization, La. 745.
  efficient use of, Pa. 374.
  farm, care, operation, and maintenance, Mo. 594.
  general-purpose farm, bulldozer for, 374.
  operations, rates for work for, Idaho 599.
  working at full capacity, savings from, N.Dak. 121.
Trade agreement, United States-Mexican, U.S.D.A. 127, 142.
Trametes—
  serialis complex, clarification of, 702.
  suaveolens, unusual sporophore produced on artificially inoculated wood, 236.
Transpiration in American holly, relation to leaf structure, 36.
Transportation, wartime problems of conservation, 381.
Trapping, publications on, 704.
Trees—
  and shrubs of Rhode Island, check list, 640.
  and wind, 168.
  coniferous, *see* Conifer(s).
  deciduous, breaking rest period, 669.
  diseases, parasitic, in Quebec, 235.
  evergreen, *see* Evergreens.
  experts, code of standards, 335.
  forest—
    growth of seedlings, measurement, 448.
    of New England, effect of spacing on efficiency of pine needles as measured by wood production on main stem, Vt. 680.
    physiology of, problems and possibilities in, 448.
    propagation, use of plant hormones in, 72.
    transpiration rates during dormant season, 448.
  growth, effect of light, 72.
  growth, relation to outbreaks of Black Hills beetle, 345.
  hardwood, of Eastern States, diseases associated with *Nectria* spp., 703.
  hardwood stands, management in Northeast, 71.
  injuries caused by *Celastrus* and *Vitis*, 703.
  of Champaign County, Illinois, 292.
  of Puerto Rico, U.S.D.A. 220.
  protection, civilian program for, Mass. 316.
  ring chronologies in Colorado River drainage area, variations in, 167.
  ring work in northern Alaska, 640.
  ring work, theories and methods, 627.
  seeds, proteins of, 281.
  shade, insect control, 92.
  shade, of Florida, pest control, 92.
  shade, pest control equipment adapted for, 92.
  southwestern, desert, revision of status, 202.
  species in mixed forests, unequal scales for rating, 423.
Tribolium—
  castaneum, *see* Flour beetle, red.
  confusum, *see* Flour beetle, confused.
  madens in British Columbia, 95.
Trichinae in pork scraps in garbage, minimum heat for destruction, 118.
Trichinella spiralis immunity—
  in rats, number of larvae and time required to produce, 251.
  transmission from mother rats to offspring, 251.
β-2-Trichloroethyl-*d*-glucoside synthesis and isolation from corn and dandelion treated with chloral hydrate, 190.

- *Trichogramma minutum*, laboratory-reared, results of releases in Puerto Rican sugarcane fields, 714.
- *Trichomonas*—
  - *foetus*—
    - bacteria-free strain, cultivation, 251.
    - comparison of pH and population, 251.
    - distribution in preputial cavity of infected bulls, 362.
    - inoculations in guinea pigs, 113, 360.
    - prolonged bacteria-free cultivation, new thermostabile medium for, 113.
  - genus, host list, 706.
- Trichomoniasis of turkeys, Mo. 120, S.C. 617.
- *Trichophyton* sp., ringworm disease due to, in muskrat, 369.
- *Trichopoda pennipes*, tracheal funnel in squash bug induced by, 94.
- *Trichostrongylus*—
  - *colubriformis*, effect on nutrition of lambs, 117.
  - spp. immature, in sheep, anthelmintic efficiency of phenothiazine against, 589.
  - spp. preparasitic stages, overwinter survival on pasture, 366.
- *Trichothecium arrhenopum* n.sp. parasitizing oospores of *Pythium graminicolum*, 76.
- *Trichuris ovis* preparasitic stages, overwinter survival on pasture, 366.
- 9,10,12 Trihydroxystearic acids, diastereoisomerism of, 276.
- *Triticum timopheevi*, stem rust on, 229.
- Trout—
  - brook, in Kettle Creek and tributaries, Pa. 336.
  - eggs contaminated with *Bacterium salmonicida*, disinfection, 90.
- Truck crop(s)—
  - condition of, Miss. 430.
  - pests, Mo. 463.
- *Trypanosoma cruzi*, natural infection of small mammals by, 119.
- Tryptophan—
  - conversion to plant growth substance, 34.
  - phospho-12-tungstates of, solubilities and compositions, 148.
- Tuberculins for cattle testing, necessity for standardization, 116.
- Tuberculosis—
  - bovine, in humans, 724.
  - eradication, highlights and shadows in, 724.
  - in cattle affected with extensive lesions, value of tuberculin test, 362.
  - market losses from, today v. 25 years ago, 724.
- Tularemia—
  - spontaneous occurrence in shrews, 588.
  - transmission to man from rodents, 236.
- Tumor(s)—
  - adenomatous, in large intestine of cats, 485.
  - enzymology, progress in, 147.
- Tung—
  - foliage, frenched, photosynthetic activity, effect of manganese sulfate, 192.
  - oil, solvent extraction, 155.
  - orchard, commercial, control of manganese deficiency in, 700.
  - orchard, young, mulch v. cultivation in, 678.
  - production in Latin America, U.S.D.A. 71.
  - thread blight, U.S.D.A. 548.
  - trees, copper deficiency, 678.
  - trees in Ruston sandy loam, distribution of small roots, factors affecting, 678.
- Turf—
  - disease control studies, plat technic for, 322.
  - grasses, effects of drought, temperature, and nitrogen, 658.
- Turkey(s)—
  - diseases, Calif. 593.
  - eggs, hatchability, effect of relative humidity and amount of turning, Ky. 353.
  - infection with Rous sarcoma virus and accompanying variations of virus, 731.
  - malaria, description, 487.
  - of different varieties and strains, composition, 246.
  - on range and in confinement, comparison of Small-Type Broad-Breasted White and the Broad-Breasted Bronze variety types of, S.C. 617.
  - poults—
    - choline requirements, 354.
    - growth, relation to quality of animal protein concentrate in diet, 353.
    - *Leucocytozoon smithi* infection and other diseases, 487.
    - livability, effect of relative humidity and amount of turning, Ky. 353.
    - respiratory disease of, 731.
    - transmission of *Hexamita* sp. from ringed-neck pheasant to, 594.
  - rations, wartime substitutes, fiber and protein in, Okla. 354.
  - research, recent developments in, N.C. 486.
  - sulfanilamide experiments with, 593.
  - swine erysipelas in, 372.
  - wild, territory, food habits of foxes in, 559.
  - young, heat exhaustion in, 487.
- Turnip(s)—
  - greens, ascorbic acid in—
    - effect of fertilizer and environment, 506.
    - effect of storage and cooking, Miss. 775.
  - production, U.S.D.A. 68.
- Tuskegee Institute notes, 511.
- Tussock moth, white-marked, egg masses of, 91.

- Typhus fever, murine, control, 588.
- Tyrocidine, toxic effects in mice and dogs. 250.
- Tyrosinase and plant respiration, 37.
- Tyrosine poisoning in rats, 725.
- Tyrothricin—
  - and penicillin, 725.
  - effect of direct applications to cells in vitro, 250.
  - synthesis by *Bacillus brevis*, 637.
  - toxic effects in mice and dogs, 250.
- Udder of cow, circulatory system of, Fla. 109.
- Underemployment in marginal area, W.Va 748.
- Undulant fever in Iowa, 724.
- U. S. Department of Agriculture—
  - available publications, list, 142.
  - Bureau of Entomology and Plant Quarantine, *see* Bureau of Entomology and Plant Quarantine.
  - Office of Experiment Stations, *see* Office of Experiment Stations.
  - report of Secretary, 141.
- Urea feeding to steers, effect on kidneys and livers, 348.
- Uredinales—
  - from northwest Himalaya, 639.
  - of Venezuela, additions to, 639.
- Urinary calculi in sheep, 364.
- Urine, human, biotin and biotin-like substances in, 772.
- *Ustilago*—
  - spp. on wild grasses, germination of, 451.
  - *striaeformis* f. *agrostidis*, germination of chlamydospores and culture, 551.
  - *zeae* chlamydospores, heritable abnormality in germination, 683.
- Utah College notes, 620.
- Utah Station notes, 512, 620.
- Utah Station report, 510.
- Vacuum—
  - distillations, pressure-measuring device for, 158.
  - fractionation, efficient column suitable for, 2.
- *Valsa leucostoma* in New South Wales, control, 694.
- Vanadium—
  - ingested, spectrographic analysis of rat tissues for, 518.
  - possible biological role, 769.
- Vegetable(s)—
  - and fruit(s)—
    - botanical distinctions between, Ohio 668.
    - cooperatives in North Atlantic States, services of, U.S.D.A. 389.
    - cooperatives, wartime adjustments of, U.S.D.A. 497.
    - sales in selected retail stores, 748.
  - blanching and preparing for locker storage, 606.
  - blanching, changes occurring during, 761.
  - boron content, 428.
  - commercial brine preservation, 396.
- Vegetable(s)—Continued.
  - dehydrated—
    - methods of drying, storage, and cooking, R.I. 396.
    - packaging requirements, 604.
    - powdered, experiments with, 603.
    - quality, factors affecting, 263.
    - sulfuring, 603.
  - dehydration—
    - and their uses, Ga. 263.
    - in the home, Tenn. 263.
    - studies, 263.
  - disease-resistant varieties for home garden, U.S.D.A. 66.
  - diseases—
    - control, La. 320.
    - in Massachusetts in 1942 and prospects for 1943, U.S.D.A. 74.
    - in Oregon, U.S.D.A. 319.
    - in Trinidad, 221.
    - in Washington State, U.S.D.A. 74.
    - unusual occurrences, U.S.D.A. 681.
    - virus, 223.
  - dried, nutritive value, 396.
  - effect of lead arsenate in soil on, 565.
  - experiments at Conservancy District Substation, N.Mex. 213.
  - fats, *see* Fat(s).
  - filter press cake as fertilizer for, P.R.U. 309.
  - Florida, vitamins A and C in, Fla. 770.
  - for dietary surveys, ascorbic acid in, 773.
  - freezing, directions for, 605.
  - freezing preservation, Colo. 762.
  - fresh and frozen, thiamine content, 400.
  - fresh, wartime motortruck transportation of, 740, Ohio 389.
  - frozen, quality in, Minn. 133.
  - gardening, *see* Garden(s).
  - grown in Northwest, wartime transportation, U.S.D.A. 741.
  - grown under various environmental conditions, mineral composition, S.C. 617.
  - growth and yield, effect of varied soil reactions, Ark. 445.
  - home drying with W. S. C. dehydrator, Wash. 763.
  - home storage, N J. 542, U.S.D.A. 310.
  - juice(s)—
    - blends, acidified, 395.
    - home preservation, N.J. 762.
    - preparation and preservation, 263.
  - market diseases of, U.S.D.A. 556.
  - marketing in Rio Piedras and San Juan, P.R.U. 496.
  - peanuts as seasoning for, Ga. 500.
  - peeling by new lye method, 283.
  - *Penicillium* development on cut surfaces, 329.
  - plants, starting in Colorado, Colo. 214.
  - preservation—
    - by brining, 609, 610, N.J. 764.
    - by freezing, T. 604.
    - handbook for wartime use, Mont. 501.

Vegetable(s)—Continued.
  production, maximum fertilization for, 683.
  seed(s)—
    cost of production in southern Idaho, Idaho 599.
    germination, effect of soil moisture conditions, 666.
    protectants, tests, U.S.D.A. 319.
    treatment, tetramethyl thiuramdisulfide for, 83.
    treatments, summary, 329.
  seedlings, hosts of viruses on, U.S.D.A 319.
  small dehydrators for, 603.
  storage for winter use, Utah 541.
  storage requirements, 760.
  studies, Wis. 617.
  sulfited, ascorbic acid in, determination, 626.
  varieties for home and commercial gardens, Wash. 214.
  varieties for winter garden region, Tex 666.
  varieties, select list, Tenn. 445.
  vitamins A and C in, effect of salting, 609.
  wastes, carotene in, 139.
Vegetation—
  alpine, in Wyoming, sample-plat technic applied to, 293.
  of Brazil, phytoecological problems, 631.
  of Cherry Co., Nebraska, 524
  of granitic flat-rocks of southeastern United States, 422.
  of Guatemala, 422.
  of Idaho, 524.
  of Iowa lake region, botanical survey, 422.
  short-grass prairie, effects of climate and grazing practices in Canada, 536.
  zones of Hawaii, Hawaii 437.
Vegetational zonation in Rocky Mountains, 422.
Velvetbean seed, viability, factors affecting, 64.
Venezuela, cradle of Americanism, U.S.D.A 142.
Verdoperoxidase, studies, 147.
Vermont Station notes, 780.
Vermont University notes, 780.
Verticillium—
  alboatrum pathogenicity, 320.
  alboatrum strains, pathogenicity, 688.
  wilt of chrysanthemums, 283.
Vetch—
  failure to excrete nitrogen from nodules when grown in association with nitrogen-deficient citrus seedlings, 677.
  hairy, cost and efficiency in producing, Oreg. 386.
  response to strains of nodule bacteria, 295.
  seed production, earliness of maturity as factor, 64.
  varieties and seedling studies, N J 51.
Veterinary—*see also* Animal diseases.
  bacteriology, revision, 358.
  surgery, sulfanilamide ointment in, 115.
Viannaia viannai in opossums in North America, 369.
Vibrio foetus infection in cattle, 116.
Victory work, organizing for farm labor, Calif. 130.
Vinca, growth response to vitamins, 296.
Viola spp., grafting experiments, 422.
Virginia Polytechnic Institute notes, 272.
Virginia Station notes, 272.
Virus(es)—
  activity, measuring, accuracy of local-lesion method, 453.
  bacterial, electron microscope studies, 684.
  diseases, lectures on, 318.
  filtrable, studies, 119, 592, 731.
  multiplication mechanism, studies, 223.
  phytopathogenic, evolution from mitochondria and their derivatives, 549, 684.
  problem of increasing importance, Md. 453.
  sizes and methods for estimation, 549.
Vitameter A, modified Hilger, 623.
Vitamin A—
  deficiency in China and cutaneous manifestation, 756.
  deficiency relation to joint lesions in horses, 367.
  in cod-liver oil and in oleovitamin A and D, comparative stability, 138.
  in colostrum of cow, effect of vitamin A-rich diet, 109.
  in eggs, spectroscopic studies, Ind. 770.
  in Florida fruit and vegetables, Fla. 770.
  in foods in terms of common measures, U.S.D.A. 138.
  in livers of sheep, cattle, and pigs, 770.
  in potatoes, inheritance of varietal differences of, 652.
  in poultry nutrition, shark liver oil as source, Fla. 580.
  metabolism and requirements determined by rhodometer, R.I. 770.
  requirement of fox, minimum, 118.
  value of Roquefort type cheese, 138.

  deficiency studies in China, 756.
  in foods, estimation, improved method, 10.
Vitamin B_6—*see also* Pyridoxine.
  metabolism, 268.
Vitamin B complex—
  deficiency, effect on inactivation of testosterone in liver, 48.
  deficiency, effect on intestinal absorption of galactose in rat, 400.
  diet deficiencies, effect on men doing manual labor, 771.
  requirements of propionibacteria, 638.
Vitamin C—*see also* Ascorbic acid.
  colorimetric determination, 625.

- Vitamin C—Continued.
  - determination by chemical titration method, reliability, 625.
  - in potatoes, inheritance of varietal difference in, 652.
  - oxidation and reduction, 282.
  - synthesis by dairy cows, evidence of, 474
  - winter sources, 774.
- Vitamin D—
  - assay, A. O. A. C. method, 581.
  - in foods in terms of common measures, U.S.D.A. 138.
  - in poultry nutrition, shark liver oil as source, Fla. 580.
  - three forms, for albino rats, comparative toxicity, 777.
- Vitamin G, *see* Riboflavin.
- Vitamin K, synthetic, detection and quantitative determination, 627.
- Vitamin(s)—
  - antihemorrhagic, *see* Vitamin K.
  - antineuritic, *see* Vitamin B_1.
  - antirachitic, *see* Vitamin D.
  - application of absorption spectra to study, 13.
  - chemically unidentified water-soluble, necessary for chicks, 580.
  - concentrates, role in war and in postwar food relief in Europe, 770.
  - constituents of foods, recent data, 769.
  - control of processed foods, methods for, 263.
  - deficiencies, effect on basal metabolism and respiratory quotient in rats, 504.
  - deficiencies of yeasts and molds, 641.
  - determination methods, 625.
  - fat-soluble, 755.
  - food, health, treatise, 262.
  - growth responses of *Soja* and *Vinca* to, 296.
  - interrelations, 504.
  - papers on, 31.
  - requirements of man, new viewpoints and relation to nutrition in Tropics, 756.
  - studies, Utah 507.
  - synthesis by intestinal bacteria, 769.
  - synthetic, industrial development, 770.
  - water-soluble, 755.
- Voles, mice, and lemmings problems in population dynamics, 336.
- Walnut—
  - blight control in wartime, 233.
  - hulls, ascorbic acid in, 678.
  - Persian, diseases in Pacific Northwest, U.S.D.A. 74.
  - Persian, surface area, 562.
- War—
  - effects on social and economic status of farm laborers, 749.
  - gases, protection of foodstuffs against, 263.
  - impact on rural community life, 749.
  - industry, loss of rural manpower to, through migration, U.S.D.A. 262.
  - programs, civilian, differential achievement among Iowa counties, 749.
- Warble fly larvae infesting domestic animals in New York State, key, 99.
- Wash bottles, insulation for necks of, 2.
- Washington Station report, 142.
- *Washingtonia to Zanthoxylum*, host-parasite check-list revision, U.S.D.A. 74.
- Wasp, cicada killing, life history and habits, 100.
- Waste lands, cutworms and armyworms in, 714.
- Water—
  - conservation, consolidation of irrigation companies as aids in, Utah 598.
  - hyacinth in California, 66.
  - infiltration into soil, determinations, reducing error in, 631.
  - management for malaria control, 98.
  - purified by synthetic ion-exchange resins, suitability for plant growth in controlled cultures, 416.
  - rain, *see* Rain.
  - supply(ies)—
    - forecasts, Utah cooperative, Utah 289.
    - of butter manufacturing plants, bacterial content, Iowa 585.
    - of upper Columbia River Basin, summary of records, 781.
    - surface, of United States, 487.
- Waterfowl—
  - breeders, publications of interest to, 704.
  - publications on, 704.
- Watermelon(s)—
  - cultural and fertilizer studies, Iowa 541, 542.
  - pollination method for, 68.
  - rinds, processing for food, 24.
  - spraying, results with copper fungicide, 694.
- Watershed-improvement programs, planning, factors assisting, U.S.D.A. 518.
- Waxpalm, Salento, studies, 31.
- Waxy coatings, permeabilities, to respiratory gases, 159.
- Weather—*see also* Meteorological observations *and* Meteorology.
  - and climate, introduction to study, 413.
  - and climate of Kansas, Kans. 25.
  - and fruit production in 1942, 513.
  - and life, solar relations to, 517.
  - Bureau report, 289.
  - Bureau, service for muck farmer, 25.
  - conditions, various, gustiness under, 288.
  - cycles and fruit diseases at Hood River, Oreg., U.S.D.A. 74.
  - effect on prune yields in Napa Co., California, 629.
  - estimates from local aerological data, 166.
  - forecasting, application of atmospheric waves to, 627.
  - from winter of 1941–42 to winter of 1942–43, U.S.D.A. 548.
  - in Nova Scotia, effects on 1942 crop, 629.
  - map construction and forecasting in westerlies from single-station data, 628.
  - types in southwest Guatemala, 167.

Webworm, beet, biochemical studies, Mont. 712.
Weeds—
    control, Minn. 213.
    control, effect of borax and borax-sodium chlorate on, Mont. 444.
    insect control of, 562.
    prairie, illustrated guide to, 606.
    publications of North Dakota Station on, N.Dak. 444.
    standard common names for, 523.
Weigert's solutions, absorption spectra, interlaboratory comparison, 161.
Weight, normal, determining, McCloy method for, 264.
Welding of 2-in. square reinforcing bars for piers of Pit River Bridge, 256.
West Virginia Station notes, 143.
West Virginia Station report, 510.
Wheat—
    and barley varieties in mixtures, survival, 51.
    and corn as main part of hens' laying rations, 244.
    bundles, hauling, buck rake performance in, Ohio 733.
    cash value per acre at different sections, Minn. 534.
    crop performance and yield for different sections, Minn. 533.
    crystalline protein from, reversal by phosphatides of antimicrobial action, 647.
    cystine in, quantitative determination, 140.
    Dawson, resistance to hessian fly in, genetic factors for, 575.
    disease resistance, breeding for, 225.
    diseases in Pennsylvania, U.S.D.A. 681.
    durum, N.Dak. 308.
    durum, constancy of rank in macaroni color, 665.
    dwarf bunt, chlamydospore germination in fungus causing, 552.
    dwarf bunt, varietal reaction to, 686.
    examination for disease, embryo exposure in, 225.
    flag smut in Washington, U.S.D.A. 681.
    flour, protein spread, ash and yield, effect of kernel size, 665.
    foot and root rot, factors affecting health of seedlings in nutrition solutions, 79.
    germ, harmful effects on baking quality, factors affecting, 150.
    germinating, amylase development in, effect of temperature, 23.
    gluten, sodium salicylate dispersion of, viscosity changes in, 149.
    glutens, comparative baking qualities, 149.
    grain, varietal differences in anatomy of cross section, 194.
    grains without embryos, 65.
    hard red spring, test-weight determination, methods, 8.
    in third war year, major developments, 122.

Wheat—Continued.
    insect pests of, 562.
    its products and uses, U.S.D.A. 284.
    kernels, smudge on, relative importance of two types, 226.
    lands of northern Idaho, land values, mortgages, rents, and yields, Idaho 123.
    leaf rust, physiologic races, adult plant resistance to, 78.
    leaf rust, physiologic races, in Chile, 226.
    leaves, carbohydrates of, diurnal changes in, 37.
    length of dormancy in, relation to after-harvest sprouting, 658.
    loose smut, reaction of varieties and strains to artificial inoculation with, 226.
    meal, particle fineness in, granulation test for, Ind. 516.
    meal, thiamine in, and stability of vitamin B_1 during bread making, 624.
    meals, high-extraction, digestibility, 611.
    new, baking tests and evaluation, 213.
    North Dakota durum, experimental milling and processing equipment, 20.
    North Dakota durum, quality, effect of blight and other damage, 19.
    plant, importance of various roots to, 65.
    powdery mildew, effect of temperature, 687.
    protein, photometric determination, 7.
    quality, testing by recording dough mixer curves, 21.
    root rot—
        in England, *Rhizoctonia solani* associated with, 687.
        outbreak in Saskatchewan, 687.
    roots, colonies of *Bacterium tabacum* on, 552.
    rust resistance, cellular changes in relation to, 450.
    scab and gum blotch in Illinois, U.S.D.A. 681.
    scab in Pennsylvania and Ohio, U.S.D.A. 681.
    seedling morphology, relation to depth of planting, 300.
    smut, stinking—
        control with Spergon, 225.
        development, effect of photoperiodism, 78.
        recorded in California as early as 1852, 75.
    spring, production, Wash. 443.
    starch, air-dry, hysteresis, 22.
    starches, comparative baking qualities, 149.
    stem rust—
        and hessian fly resistant varieties and hybrids, tests, 541.
        biotypes of race 34, studies, 323.
        browning reaction to, 323.
        control by rust-resistant varieties and barberry eradication, Colo. 323.

Wheat—Continued.
- stem rust—continued.
  - fungus, mutant character in, inheritance, 652.
  - physiological races, development, 225.
  - physiological races, in Chile, 226.
- take-all, fungi isolated from lesioned roots, effect of biotin and thiamine on growth, 424.
- thiamine distribution in plant at successive stages, 65.
- varieties—
  - and seeding studies, N.J. 51.
  - for Montana, Mont. 439.
  - improved, registration, 212.
  - improvement, progress in, N.Dak. 66.
  - response to levels of soil productivity, 212.
- variety—
  - tests, N.Mex. 534.
  - Warigo, disease-resistant cross, 454
- winter, adaptation for supplementary pasture, 53.
- winter, natural selection in varietal mixtures, 65.
- world, survey and outlook, 261, 600.
- yield, forecasting, condition reports and weather data in, U.S.D.A. 516.

Wheatgrass—
- crested—
  - breeding methods, 59.
  - effect on soil characteristics, 632.
  - winter survival in fall sown plats, 659.
- slender, winter survival in fall sown plats, 659.

Whey—
- dried, browning, effect of moisture, 157.
- solubles as source of growth factors in chick rations, 352.
- *Streptococcus agalactiae* agglutinins in 116.

White ants, *see* Termite(s).

White grub—
- problem in New York State, N.Y.State and Cornell 344.
- situation in Ontario in 1941 and forecast for 1942, 91.
- situation in Ontario in 1942 and forecast for 1943, 707.

White pine
- blister rust—
  - cankers, *Dasyscypha* associated with, 558.
  - control in Michigan, 235.
  - control in Ontario as post-war employment, 235.
  - problem, 89.
  - relations of cultivated red currants, 333.
- cuttings, rooting, changes induced by indoleacetic acid in, 72.
- in southern Appalachians, growth response to green pruning, 546.

White pine—Continued.
- reproduction, response to liberation in southern Appalachians, 317.
- weevil control, value of removal of tips from trees, 95.
- weevil studies, U.S.D.A. 241.
- wood characters, 31.

Whitetop control on irrigated farms, Wash. 445.

Wildlife—
- available publications on, 704.
- crop damage by, reducing, Oreg. 335.
- international protection of, 89.
- refuges, 461.
- refuges, national, administered by Fish and Wildlife Service, 704.
- research and management, 704.
- Review, 704.

Willow gray scab, cause, 335.

Wind(s)—
- and trees, 168.
- erosion, *see* Soil erosion by wind.
- of United States, 628.
- velocity, rapid variations of, importance of study, 288.

Wine making, role of micro-organisms and enzymes in, 147.

Wire—
- baling, device to reclaim for reuse, Mont. 378.
- high-strength, for precast concrete beams, Colo. 256.

Wireworms—
- control methods, 715.
- eastern field, on shade-grown tobacco, control, 716.
- tests of 1,1-dichloro-1-nitroethane against, 561.

Wisconsin Station notes, 620.

Wisconsin Station report, 269, 617.

Wisconsin University notes, 408, 620.

Women, college, nutritional status, effect of selection of data on mean basal metabolism, 767.

Wood(s)—
- for war emergency fuel, Mo. 73.
- Michigan, use in container industry, 318.
- rats, natural infection of Chagas' disease with, 119.
- southern, cellulose content, 157.
- treated, biological environment, relation to service life, 120.

Woodland(s)—
- cooperatives, management and marketing of products, U.S.D.A. 220.
- relation to farming enterprise, U.S.D.A. 317.

Woodpecker(s)—
- ivory-billed, studies, 560.
- of genus *Colaptes*, nature of red, yellow, and orange pigments in, 47.

Woody plants—
- along streams in Ellis Co., Kansas, 292.
- distribution in Gainesville area, Florida, correlation of soil pH with, 293.

Wool—
- chemically modified, 615.
- clean, yield, variation from different parts of Rambouillet fleeces, 720.
- fabric, effect of various storage conditions, 615.
- fineness in eight sampling regions on yearling Rambouillet ewes, 720.
- glass, pyrex brand as filtering medium, 412.
- insect pests of, 562.
- pigmented, inheritance of, 432.
- production—
  - and sheep scab, Mo. 482.
  - from ewes and rams of different breeds, N Mex. 719.
  - staple length in relation to, 105.
- reclaimed, durability, S Dak. 405.
- samples, scouring, for equitable basis of price determination, Utah 126.

Wyoming Station notes, 408.

Wyoming University notes, 408.

Xanthium, translocation of floral stimulus in, 189.

Xanthomonas—
- definition of generic name for certain bacterial plant pathogens, 319.
- *translucens*, classification revision in, 77

Xoridescopus annulicornis biology, 717.

X-rays, stimulating effects on plants, 38.

Xylariaceae, South African, 639.

Xylocopa orpifex nests, dried fruit moth breeding in, 338.

Yam bean as possible insecticide, 562.

Yeast(s)—
- as protein supplement for pigs, relation to appearance of rickets, 721.
- commercial, variations in yield and colony size, 294.
- feed, production, from citrus waste press juice, 158.
- induced autotrophism in, 424.
- pantothenic acid in, microbiologic assay, 624.
- resistance to low temperatures, 642.
- spores, staining, 651.
- stored, dry and moist, viability and baking properties, effect of temperature, 135.
- synthesis of riboflavin by, 641.
- vitamin deficiencies of, 294, 641.

Youth, rural, war and migration of, 750.

Yucca mohavensis, new fructosan isolated from, 282.

Zabrotes subfasciatus, new pest in Utah, 562.

Zein dispersions, stabilizing, against gelation, 153.

Zenillia and allied genera, Nearctic species, revision, 99.

Zinc—
- copper, and lead, separation with salicylaldoxime, 161.
- determination in soil, 6.
- fixation on colloidal clays, mechanism, 635.

Zinnia *Alternaria* disease, 334.

Zoological sciences, guide to literature, 89.

Zoology, general, treatise, 89.

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